No. 4694-A.
7

FROM

L. S. CAREY, ESQ., I. C. S.,

COMMISSIONER OF SETTLEMENTS AND AGRICULTURE,

*Central Provinces,*

To

THE SECOND SECRETARY TO THE CHIEF COMMISSIONER,

REVENUE DEPARTMENT,

*Central Provinces.*

SUBJECT:
Report on the Nagpur Experimental Farm for the year 1894-95.

*Dated Nagpur, the 29th November* 1895.

SIR,

I have the honour to submit the Annual Report on the Nagpur Experimental Farm for the year ending 31st March 1895.

2. In accordance with the instructions of the Government of India acting on the suggestion of the Agricultural Chemist, the arrangement of the Annual Report has been altered. The various experiments have been classified under certain main heads, so as to be easily traced by any one desirous of information, and the results attained from the date that each experiment was started have been brought together for purposes of ready reference. The object with which each experiment has been undertaken is also stated, and such conclusions as appear justified have been drawn. Altogether the results are exhibited from the point of view of the general public in a more convenient and instructive manner.

3. The season was a most unfavourable one for the agriculturists of the Central Provinces, and its effects were such on the operations of the Farm as to vitiate or obscure the results in the majority of the experiments. The heavy falls of rain in the latter half of October and the first half of November, when the spring crops were on the ground, damaged the seedlings on the low-lying fields to such an extent that resowing was widely necessitated. This late sown seed in many cases failed to yield a good outturn. The crop was too short a time in the ground to arrive at proper maturity. Moreover the hot weather came on early, and the scorching winds dried up the grain before the ears had properly filled.

Linseed was badly affected by rust throughout the Provinces, and the yield on the Farm was very short indeed. Not only did the rabi crops suffer, but the ripening kharif was much damaged by the deluges of rain which characterized the late autumn.

Juar (*Sorghum vulgare*) suffered, but not to the same extent as cotton. The plants of the latter shed their leaves and unripe bolls, owing to the unfortunate excess of moisture.

4. The longest established experiments on the Farm are two, which have the object of testing the effect of applying to wheat different kinds of manure continuously year after year. In the first experiment which has been conducted for eleven successive years, no irrigation is used. In the supplementary experiment which was introduced five years ago, the same conditions are observed with the sole exception that the wheat receives artificial irrigation.

As far as the unirrigated fields were concerned, the experience of the year is not different from that of its predecessors, and it appears that the extra yield obtained from the use of manures fails to recoup the expenditure, which may be attributed to the fact that owing to the absence of cold weather rain, the full effect of the manure is not produced, and part of it remains in the soil in an insoluble and therefore unavailable condition.

The advantageous effect of green soiling as a recuperative agency is however making itself apparent.

Irrigation gave no profit in the year, but to a certain extent did harm by checking the growth of the wheat plants in the already water-logged soil.

A new experiment has been started with the view of comparing the yields of wheat on land manured in June according to the usual agricultural practice, and in August when the heaviest bursts of the monsoon are over and there is less chance of the soluble particles of the manure being washed away in the drainage. This experiment promises to be of a most interesting nature. The plot manured in August gave the larger outturn, but no definite conclusions can be drawn from the returns of one year. The experiment will be repeated.

5. In the rotation experiments, wheat sown after a papilionaceous crop, such as tur or gram, which conveys nitrogen from the atmosphere to the soil, was found to succeed well. In this class of experiments, in which linseed plays a part, the failure of this crop during past years has quite obscured the results.

Several experiments have been made with the object of testing the effect of manures on crops grown in rotation. The only result hitherto attained is that it is more remunerative to grow crops in rotation, provided they are of the character which recuperates the soil, than to leave the land fallow.

6. Experiments made with mixtures of crops indicate that the ordinary agricultural practices of the country are well conceived and tend to profit. Wheat derives advantage from being associated with gram; similarly juar and tur is a useful mixture. The cotton crop has suffered so much in recent years that nothing has been learnt as to the expediency of sowing a mixture of cotton and juar.

As regards tillage, the results of previous years are corroborated in so far as they indicate that periodical ploughing every third year with intermediate scarifying of the soil is the system best suited to these parts. Several varieties of cotton and wheat have been tried with a view to contrasting the quantity and value of the outturns. The Nimari cotton has done fairly well both in respect of yield and quality. The outturn of Mozaffarnagar wheat has been compared with that of the local varieties, such as *haura* and *pissi*, but hitherto the results are contradictory.

7. The disease which has had the most baneful effect in recent years in these Provinces is *rust*. Various experiments have been tried, the object of which is either to gain some insight into the origin of the disease or to discover some preventive or palliative. The experience derived on the Farm tends to show that the disease is not latent in the seed. Rusted wheat seed produced a crop equal in quality to the crop grown from seed which had not similarly suffered. Neither of the crops were damaged by rust this year. The only difference preceptible was in the relatively defective germination of the rusted seed. *Mundia pissi* is reputed to be rust proof. This variety was accordingly tried alongside of other varieties, such as *haura*, *katha* and *pissi*, which do not enjoy the same immunity. None of the crops suffered from fungoid disease during the year under report, and no conclusive results were therefore obtained. The field in which this experiment was tried was one in which crops had suffered very considerably from rust in the previous year. The inference then seems justified that the spores of the rust do not lie latent in the ground.

Digitized with financial assistance from

8. A very interesting experiment was started in the cross fertilization of *Mundia pissi* with other varieties, *viz.*, *haura*, *pissi* and *katha*, which are subject to rust, and with these varieties amongst themselves. The idea was suggested

Hemendra Kothari

on 24 February, 2020

by an article which recently appeared in the *Agricultural Gazette* of New South Wales. *Mundia pissi* is not a very marketable commodity, and the aim of the experiment is to obtain a variety which will not only be proof against rust, but will also command a good price in the market. Some grains were obtained from the following combinations, the grain mentioned first being the father and the latter the mother—

| | |
|---|---|
| *Katha* with *pissi.* | *Mundia* with *katha.* |
| *Haura* with *mundia pissi.* | *Katha* with *mundia.* |

*Haura* with *pissi.*

These grains have now been sown and are thriving well. The outcome of this experiment will be watched with interest.

9. The experiment for preventing damage to rabi crops from trees in their vicinity by cutting a trench between the tree and the crop was repeated this year with similar success. This matter has been brought to the notice of Deputy Commissioners, and they have been asked to induce malguzars and cultivators, whose crops suffer from the presence of trees on their fields, to try this system. Kharif crops do not suffer similarly, and rice and kodon are frequently grown in these Provinces under mahua and other trees. The explanation lies in the fact that during the rainy season there is abundance of moisture for both the crops and the trees, but in the other seasons, the trees being the stronger organism with far spreading roots, flourish at the expense of the crops. The simple expedient of digging a trench between the tree and the crop has been found an efficacious remedy.

In connection with sugarcane cultivation, it was discovered that mulching the surface of the soil during the hot weather had the double effect of checking surface evaporation and stifling the growth of the weeds. The crop so treated throve better and gave a superior outturn to that cultivated in the ordinary way.

10. Continued efforts have been made to arborise the Telinkheri reserve, but much damage has been done by stray cattle. It has been recognized that no great success can be attained until the area is fenced in. A commencement has now been made in this direction. An experiment in the ensilage of the grass grown on the reserve proved successful, and the fodder of the silo was greedily devoured by cattle. Samples of (i) the silo, (ii) hay made from grass grown on the reserve, and (iii) grass cut dry were forwarded to the Agricultural Chemist for analysis, the results of which show the importance of cutting grass in the green state. All samples were found to contain a very small proportion of albuminoids, but considering the poverty of the soil on this barren hill, the results are not surprising.

11. The Agricultural class connected with the Farm has been conducted on the same lines, practical training in the various agricultural operations being an important feature, as heretofore. The students who have hitherto joined have come in the hope of obtaining Government employment, and no success has attended efforts made to induce sons of malguzars and others to attend the class with the object of acquiring knowledge, which may prove useful to them in the future management of their estates. Of the eight students who passed out during the year, two have obtained posts in the Forest Department and one under the Court of Wards The others have been appointed Probationary Revenue Inspectors in the Settlement Department. As usual two classes were held during the year for the instruction of village school-masters in the rudiments of agriculture. The men sent by the Educational Department being younger than in past years were able to assimilate better the teaching of the professors. Now that the necessity has been recognized for reform in the educational system with a view to the development of the powers of observation by the aid of manual training and object teaching, the advantages of this institution are accentuated. It is endeavoured to make the teaching of the normal class as practical as possible, and to this end outdoor lectures on the Farm supplement the teaching of the school. It is hoped that the village masters will thus be enabled on return to their villages to impart useful knowledge of

a practical kind to the boys entrusted to their care, and give them an interest in the properties, working and application of the material things and forces which surround them in their every day life.

12. Mr. R. S. Joshi was in charge of the Farm throughout the year, and has exhibited the same energy, devotion to duty and resourceful aptitude as has characterized his management in past years, and earned for him the approbation of my predecessors. His clever and careful manipulation of difficult experiments such as the cross fertilization of wheat alluded to in paragraph 8 above, entitles him to special commendation.

During the year he accompanied Dr. Watt, Reporter on Economic Products, on a short tour throughout the Katol Tahsil of the Nagpur District. This trip into the interior had beneficial results, as it gave him a greater insight into the agricultural conditions of the Provinces. I hope to be able to arrange a short tour for him during the cold season of 1895-96, and I have under consideration the expediency of sending one of the Mysore bulls kept in the Farm under his charge to the village of *Jaitpur* in the Sausar Tahsil of the Chhindwara District where cattle breeding operations are, I learn, conducted with some success. The village belongs to Lachmi Bai Naikim, whose estate is under the Court of Wards, Nagpur, and I am anxious to ascertain what scope exists for improving the breed of cattle, a subject on which you recently addressed me in your letter No. 2905, dated the 1st July 1895.

I have the honour to be,

Sir,

Your most obedient Servant,

L. S. CAREY,

*Cmmr. of Settlements and Agriculture.*

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No. 65 of 1895.

FROM

THE SUPERINTENDENT,

GOVERNMENT EXPERIMENTAL FARM,

*Nagpur,*

To

THE COMMISSIONER OF SETTLEMENTS AND AGRICULTURE,

*Central Provinces.*

SUBJECT:

Report on the Nagpur Experimental Farm for the year 1894-95.

*Dated Nagpur, the 23rd October* 1895.

I have the honour to submit the Eleventh Annual Report on the working of the Experimental Farm, Nagpur, for the year ending 31st March 1895.

2. Endeavours have been made to give effect to the suggestions of Dr. Leather, Agricultural Chemist to the Government of India, in his Note on the recording and publication of results obtained at Experimental Farms in India, which was circulated under cover of letter No. 6-33-2, dated 22nd April 1895, of the Government of India in the Revenue and Agricultural Department, and it is hoped that the form in which the report is now presented will be found more convenient and more instructive.

The order in which the different subjects will be treated is as follows :—

I.—History of the Farm.

II.—Character of the Season during the year under report.

III.—Manure Experiments.

IV.—Rotation Experiments.

V.—Experiments in Manure and Rotation.

VI.—Experiments with Mixture of Crops.

VII.—Experiments with Tillage.

VIII.—Variety of Crops.

IX.—Experiments with Plant Diseases.

X.—Method of Cultivation.

XI.—Trial of Implements.

XII.—Cattle-breeding.

XIII.—Experiments with Fodder and Forest Reserves.

XIV.—Sewage Farm

XV.—Agricultural Class.

The present arrangement of the report differs widely from that of previous years. The main heads are of a sufficiently general nature to embrace any experiments that may be started in future years, and in this view it should be possible to adhere to the present arrangement from year to year.

## I.—HISTORY OF THE FARM.

History.

3. The Nagpur Experimental Farm was established in 1883, in which year the former Model Farm was given up and the present site selected in its stead. The land is close to Nagpur, and is of a moderately typical class of the kind which is to be found in the Central Provinces. It consists of a fairly level piece of land of about 90 acres in extent, out of which about 67 acres are under cultivation, the rest being occupied by roads, buildings and waste land. The soil is of the black-cotton type, but somewhat inferior. It varies in depth from 4 to 10 feet, and is situated upon a gneiss rock. The natural drainage is however bad, and kharif crops frequently suffer in consequence. The road to Ambajhari, which intersects the Farm, acts as a sort of embankment to hold up the water, but new drains have recently been opened, which appear to be answering the purpose for which they were designed.

## II.—CHARACTER OF THE SEASON.

Season.

4. The following table compares the rainfall of the year as registered on the Farm, with the average of the preceding twenty years :—

*Rainfall,* 1894-95.

| Month. | Number of rainy days. | Rainfall. | Average of twenty years preceding. | Month. | Number of rainy days. | Rainfall. | Average of twenty years preceding. |
|---|---|---|---|---|---|---|---|
| | | Inches. | Inches. | | | Inches. | Inches. |
| | | | | Total brought forward ... | 62 | 49·47 | 43·73 |
| April ... 1st half ... | 1 | ·18 | ·10 | October ... 1st half ... | ... | ·02 | 1·64 |
| April ... 2nd half ... | ... | ... | ·22 | October ... 2nd half ... | 7 | 4·13 | 1·14 |
| May ... 1st half ... | ... | ... | ·26 | November.. 1st half ... | 4 | 2·48 | ·71 |
| May ... 2nd half ... | 1 | ·16 | ·28 | November.. 2nd half ... | ... | ... | ·21 |
| June ... 1st half ... | 5 | 3·45 | 3·10 | December.. 1st half ... | ... | ... | ·14 |
| June ... 2nd half ... | 5 | 4·50 | 4·94 | December.. 2nd half ... | 1 | ·18 | ·35 |
| July ... 1st half ... | 10 | 5·95 | 7·57 | January ... 1st half ... | ... | ... | ·43 |
| July ... 2nd half ... | 8 | 7·61 | 6·80 | January ... 2nd half ... | ... | ... | ·25 |
| August ... 1st half ... | 7 | 5·14 | 6·35 | February.. 1st half ... | ... | ·05 | ·11 |
| August ... 2nd half ... | 8 | 8·36 | 4·69 | February.. 2nd half ... | 2 | ·62 | ·26 |
| September.. 1st half ... | 9 | 10·18 | 4·75 | March ... 1st half ... | 1 | ·31 | ·11 |
| September.. 2nd half ... | 8 | 3·94 | 4·67 | March ... 2nd half ... | 2 | ·40 | ·21 |
| Total carried over ... | 62 | 49·47 | 43·73 | GRAND TOTAL ... | 79 | 57·66 | 49·59 |

NOTE.—A rainy day is taken as one on which there was a fall of not less than 10 cents.

The showers which fell at the end of the hot weather were very light, and rendered no assistance towards preparing the land to secure the crops. But the monsoon burst somewhat before its usual date, *viz.*, on the 1st of June, and afforded early facilities for conducting the usual agricultural operations. The actual sowing of the kharif crops began on the 18th of June. The rainfall of July was about equal to the average of the preceding years, but the rainfall of August, especially in the latter fortnight, was abnormally heavy, and the process of weeding was thereby very greatly impeded. The September rain which amounted to no less than 14 inches against an average of 9, caused much damage to the cotton crops. The plants shed their leaves and unripe bolls owing to unfortunate excess of moisture. Juar (*Sorghum vulgare*) also suffered considerably, but not so much as cotton. Linseed and wheat were sown in the beginning of October; the seed germinated well, but the heavy deluges of rain in the latter half of October and the first half of November damaged the seedlings in low-lying fields to such an extent that resowing was necessitated. The linseed crop was almost a total failure this year, not only on the Farm but throughout the Provinces. The damage caused by rust was so great that some cultivators did not even take the trouble to reap their crops. The experience derived this year on the Farm corroborated that of previous seasons as to the advantages of early sowings; the earlier sown crop being less affected by fungoid disease. Linseed sown at the beginning of October produced at least a 4-anna crop, while the late sown crop gave no outturn at all. Similarly with wheat what was sown early, that is on the 13th of October, succeeded better than that which was sown later. The wheat crop on the Farm escaped rust this year, but the crop did not thrive well. The grains were small and only partially developed—which may be attributed to the soil being water-logged, owing to the excess of rain, and the flow of water in the soil being thereby impeded, damage naturally resulted to the crops. The sky was constantly overcast during the cold season, and the weather was in consequence often sultry—conditions which are decidedly unfavourable for wheat, which flourishes especially in clear cold weather.

## III.—MANURE EXPERIMENTS.

Manure.

5. The different manures tried on the Farm fall into two classes, *viz.*, natural and chemical.

The natural manures are :—

(1) Box-dung.
(2) Stall-dung.
(3) Saltpetre.
(4) Bone-dust.
(5) San hemp (*Crotolaria juncea*) ploughed in green.
(6) *Psorolia corilifolia* (Bawachi).
(7) Ashes of cattle-dung.

The chemical manures are :—

| | |
|---|---|
| (1) Ammonium chloride. | (3) Potassium sulphate. |
| (2) Calcium superphosphates. | (4) Calcium sulphate. |

No description of chemical manures is necessary. That of the ordinary manures is appended.

(1). *Box-dung.*—Box-dung is prepared in the Farm in the following manner. A pit measuring 10′ × 10′ and 2′ × 6′ deep is dug in the cattle-shed and is brick lined on four sides. A pair of bullocks are tied in the pit, while the other bullocks are stalled in the cattle-shed. The excrements (urine and dung) of the former fall in the pit and the little straw that is left uneaten in the manger is spread over the excrements in the morning when the bullocks are let out either for work or for grazing. It takes generally from five to six months for the pit to be filled up to the top. It is then carted away, and deposited in an ordinary pit dug in the ground for storing manure. These pits are covered over with straw to check evaporation, and are watered occasionally in the hot weather between March and June. The manure is not used until the lapse of one year from the date of deposit. As this manure contains about one-half litter, a larger proportion is applied to an acre of land, *viz.*, 240 maunds compared with 160 maunds of stall-dung manure which contain no litter.

(2). *Stall-dung.*—The term stall-dung is applied to dung collected from the cattle-shed from day to day and stored in an ordinary pit. This manure is also covered over with straw and watered at intervals in the hot weather. This manure contains no urine, but only the solid excrements of the bullocks without straw.

(3). *Saltpetre.*—The saltpetre that is used on the Farm is crude saltpetre, obtained from Cawnpore through the Director of Land Records and Agriculture, North-Western Provinces and Oudh. It is of two descriptions, black crude, and white which is a purer variety. Samples were sent to Dr. Leather for analysis, the results of which are given below :—

| | White, pure. | Black, crude. |
|---|---|---|
| Water ... ... .. | 1·55 | 6·05 |
| Nitrate of Potash ... ... ... | 94·91 | 51·19 |
| Chloride of Sodium ... ... ... | 1·93 | 6·33 |
| Sulphate of Soda, &c.... ... ... | 1·21 | 21·09 |
| Sand ... ... ... | ·40 | 15·34 |
| | 100·00 | 100·00 |

In reference to his analysis Dr. Leather writes as follows : —

"The prices were Rs. 10 per maund for the white, and Rs. 3 per maund for the black, and as you will see from the percentage of nitrate of potash, the purer one is proportionally the dearer. I am not sure whether the above prices were for the materials carriage paid, *i. e.*, at Nagpur, or whether the cost of carriage must be added. If the latter be the case, it may equalize the cost of the pure salt somewhat.

"The samples were taken at random, and it would of course be unsafe to conclude that the impure salt has always approximately this composition, but it will show that when manuring with the impure salt considerably less nitrate is supplied than when the pure salt is used.

"Regarding the sulphate of soda which is present, I hardly think that the quantity of this salt, which would be present in the one or two maunds which you apply per acre, would do the crop (say wheat) any injury."

The amount of saltpetre applied in the Farm is 240 lbs. to the acre, and it is, as a rule, drilled in with the seed.

(4). *Bone-dust.*—This manure is prepared in the following manner: Bones of animals are pounded in a mill, such as is usually used for grinding lime (*chunam*). They are then passed through a sieve, and the fine powder resulting is applied at the rate of 360 lbs. to the acre, the method of application being the same as in the case of saltpetre.

(5). *San hemp* (Crotolaria juncea) *ploughed in green.*—The seed of the hemp is sown broadcast at the beginning of the rains at the rate of 100 lbs. per acre. On the 15th of August as the plants approach maturity, they are uprooted by hand and are buried in the furrows made by the Swedish plough. The plant san hemp is one of the order *Leguminosae*, sub-division *papilionaceæ*, which have the property of storing nitrogen from the atmosphere at their roots by the aid of nodules.

(6). *Psorolia Corolifolia.*—This weed grows in abundance on the waste lands of the Farm. It was observed that this plant being a papilionaceous weed, possessed the property of storing nitrogen like san hemp, and hence it has been selected for the purpose of green manuring. These plants are raised and ploughed just in the same fashion as described above for hemp.

(7). *Ashes of Cattle-dung.*— Cattle-dung is collected and made into cakes which, when dry, are burnt and reduced to ashes. 3,080 lbs. are applied per acre.

Experiments with different manures.

Eight distinct experiments have been instituted to test the comparative value of different manures or different methods of manuring. Perhaps the most important are those which are conducted on the two series of plots called A and B, in which wheat is annually manured with different materials, the only difference in treatment being that the A series is unirrigated, whilst the B series receives artificial irrigation. Series A was started eleven years ago: series B five years ago.

In fields 18 and 32 the effect of manuring wheat with a green crop ploughed into the land in August is compared with the outturn of land manured with cattle-dung. The effect also on the wheat crop of saltpetre is tested in field 68. In fields Nos. 15 and 22, wheat is manured with cattle-dung, which is put on the land at different periods, two plots being manured in June and the others in August.

Lastly a series of plots are manured on the system devised by Mr. G. Ville.

The results of this year obtained in the case of each of these experiments are tabulated in the following statements, together with those of previous years, and such remarks as are deemed necessary are added in each case.

SERIES A.—SUBJECT.—*Effect on wheat grown continuously of different kinds of manures applied year after year without irrigation.*

Plot 1.—Area 0·10 acre. Manured with Saltpetre, 240 lbs. per acre.
„ 2. „ 0·10 „ „ Bone-dust, 360 lbs. per acre.
„ 3. „ 0·10 „ „ Saltpetre, 240 lbs. and bone-dust 360 lbs. per acre.
„ 4. „ 0·10 „ „ Dung, 160 maunds per acre.
„ 5. „ 0·10 „ „ Dung, 160 maunds and bone-dust 360 lbs. per acre.
„ 6. „ 0·10 „ „ Ashes of 160 maunds dung per acre.
„ 7. „ 0·10 „ „ Unmanured.
„ 8. „ 0·10 „ „ Green manured with san hemp.
Commenced in 1884-85. Unirrigated. Crop, wheat (haura) Nagpur.

| No. of plot. | OUTTURN PER ACRE. | | | | | | | | | | | | | Cost of cultivation. | Cost of manure. | Gain in value on plot 7. | AVERAGE FOR FIVE YEARS. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average of five years 1885—89. | | 1890-91. | | 1891-92. | | 1892-93. | | 1893-94. | | 1894-95. | | | | | | OUTTURN PER ACRE. | | | Gain in value on plot 7. |
| | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Value. | | | | Grain. | Straw. | Value. | |
| | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | lbs. | lbs. | Rs. a. p. | Rs. a. p. |
| I | 1,133 | 1,711 | 1,227 | 2,390 | 612 | 707 | 420 | 1,400 | 682 | 1,077 | 815 | 1,765 | 30 14 6 | 11 12 4 | 20 3 4 | 13 14 0 | 751 | 1,468 | 28 15 3 | 12 14 8 |
| II | 891 | 1,388 | 685 | 925 | 567 | 682 | 267 | 1,012 | 560 | 810 | 590 | 980 | 20 13 7 | 13 2 10 | 3 6 2 | 3 13 1 | 534 | 882 | 19 14 7 | 3 14 0 |
| III | 1,094 | 1,751 | 1,360 | 2,620 | 697 | 742 | 587 | 1,502 | 860 | 1,265 | 820 | 1,560 | 30 5 0 | 12 4 8 | 23 9 6 | 13 4 6 | 865 | 1,538 | 32 10 11 | 16 10 3 |
| IV | 913 | 1,520 | 937 | 2,072 | 602 | 757 | 312 | 1,607 | 671 | 1,342 | 611 | 1,189 | 22 10 11 | 12 4 8 | 11 6 6 | 5 10 5 | 627 | 1,393 | 24 12 11 | 8 12 4 |
| V | 953 | 1,415 | 755 | 1,495 | 557 | 722 | 477 | 1,582 | 832 | 1,000 | 708 | 1,322 | 26 1 3 | 13 1 2 | 15 0 10 | 9 0 9 | 666 | 1,224 | 25 1 11 | 9 1 4 |
| VI | 949 | 1,598 | 717 | 1,427 | 535 | 875 | 377 | 1,212 | 573 | 950 | 680 | 1,160 | 24 10 3 | 11 10 8 | 11 3 2 | 7 9 9 | 576 | 1,125 | 22 2 5 | 6 1 10 |
| VII | 799 | 1,297 | 515 | 972 | 450 | 550 | 230 | 950 | 413 | 790 | 480 | 720 | 17 0 6 | 11 4 10 | ... | ... | 418 | 796 | 16 0 7 | ... |
| VIII | 705 | 1,137 | 760 | 1,317 | 582 | 877 | 312 | 1,137 | 601 | 1,120 | 665 | 1,125 | 24 1 1 | 10 1 8 | 7 8 10 | 7 0 7 | 584 | 1,115 | 22 6 9 | 6 6 2 |

Wheat was sown on the 17th November in all the plots. This field was not sown at the same time with the other fields, *viz.*, in October, as it was not in a fit condition for sowing owing to the heavy rainfall of the late autumn.

Manuring with dung and saltpetre increases the yield considerably, but the value of the extra grain resulting does not cover the cost of the manure in any case. As previously pointed out, this is due to the manures not producing their full effect owing to the absence of the cold weather rain whereby the manures remain in an unavailable condition. The average outturn of the unmanured plot during the last quinquennial period, after excluding the season 1892-93, when the crop suffered so much from rust, is much less than during the five years immediately preceding, and the advantageous effect of green soiling as a recuperative agency is beginning to make itself apparent. The cost of this operation is now all but covered by the gain in value accruing from the adoption of this system.

SERIES B.—SUBJECT.—*Effect on wheat grown continuously of different kinds of manures applied year after year with irrigation.*

Plot 1.—Area 0·10 acre. Manured with Saltpetre, 240 lbs. per acre.
„ 2. „ 0·10 „ „ Bone-dust, 360 lbs. per acre.
„ 3. „ 0·10 „ „ Saltpetre, 240 lbs. and bone-dust 360 lbs. per acre.
„ 4. „ 0·10 „ „ Dung, 160 maunds per acre.
„ 5. „ 0·10 „ „ Dung, 160 maunds and bone-dust 360 lbs. per acre.
„ 6. „ 0·10 „ „ Ashes of 160 maunds dung per acre.
„ 7. „ 0·10 „ „ Unmanured.
„ 8. „ 0·10 „ „ Green manuring with san hemp.
Commenced in 1890-91. Irrigated once from the 26th to the 31st January 1895. Crop, wheat (haura) Nagpur.

| No. of plot. | Outturn per acre. 1890-91. Grain. | 1890-91. Straw. | 1891-92. Grain. | 1891-92. Straw. | 1892-93. Grain. | 1892-93. Straw. | 1893-94. Grain. | 1893-94. Straw. | 1894-95. Grain. | 1894-95. Straw. | 1894-95. Value. | Cost of cultivation. | Cost of manure. | Gain in value on plot 7. | Cost of Irrigation. Labour. | Cost of Irrigation. Assumed water-rate per acre watering. | Average for five years. Outturn per acre. Grain. | Straw. | Value. | Gain in value on plot 7. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | lbs. | lbs. | Rs. a. p | Rs. a. p. |
| I | 1,532 | 2,662 | 1,375 | 1,645 | 482 | 2,127 | 501 | 1,160 | 767 | 1,352 | 27 15 3 | 13 3 8 | 20 3 4 | 12 8 1 | 0 13 4 | 2 0 0 | 931 | 1,789 | 35 12 0 | 17 9 8 |
| II | 937 | 1,265 | 847 | 992 | 432 | 1,037 | 423 | 627 | 492 | 847 | 17 13 9 | 11 4 10 | 3 6 2 | 2 6 7 | 0 13 4 | 2 0 0 | 626 | 954 | 22 15 8 | 4 13 2 |
| III | 1,502 | 3,005 | 1,427 | 1,732 | 587 | 1,882 | 596 | 1,320 | 947 | 1,682 | 34 9 0 | 14 3 6 | 23 9 6 | 19 1 10 | 0 13 4 | 2 0 0 | 1,012 | 1,924 | 38 10 6 | 20 8 0 |
| IV | 1,037 | 1,495 | 1,095 | 1,375 | 280 | 1,450 | 510 | 830 | 662 | 937 | 23 4 8 | 12 13 10 | 11 12 4 | 7 9 6 | 0 10 10 | 2 0 0 | 717 | 1,217 | 26 14 3 | 8 11 9 |
| V | 1,035 | 1,475 | 1,080 | 1,330 | 375 | 1,775 | 559 | 1,100 | 645 | 1,035 | 23 2 3 | 12 11 4 | 14 8 6 | 7 11 1 | 0 15 0 | 2 0 0 | 739 | 1,343 | 27 15 3 | 9 12 9 |
| VI | 962 | 1,050 | 697 | 762 | 300 | 1,080 | 473 | 970 | 486 | 714 | 17 2 9 | 11 9 10 | 11 3 2 | 1 11 7 | 0 13 4 | 2 0 0 | 584 | 915 | 21 7 0 | 3 4 6 |
| VII | 802 | 1,035 | 642 | 727 | 200 | 960 | 364 | 630 | 424 | 746 | 15 7 2 | 12 3 0 | ... | ... | 0 13 4 | 2 0 0 | 486 | 820 | 18 2 6 | ... |
| VIII | 925 | 1,487 | 632 | 857 | 242 | 1,317 | 463 | 870 | 560 | 920 | 20 2 7 | 10 3 4 | 7 11 4 | 4 11 5 | 0 10 10 | 2 0 0 | 564 | 1,090 | 21 7 10 | 3 5 4 |

Wheat was sown in these plots on the same day on which it was sown in the A series. The results of this series are somewhat misleading, because the rainfall having been heavy in the late autumn during recent years, the black soil of the Farm is water-logged and artificial irrigation was not really needed. These plots were irrigated from the 26th to the 31st January as B series are required to be irrigated every year.

This year, however, irrigation did more harm than good to the crop. I observed that while the wheat plants in the A series or in other unirrigated plots had grown from 2 to 2½ feet in height, the plants in this series were stunted. By comparing the grains of the A series with that of the B series, I found that 95 grains of the latter weighed a dram compared with 90 of the former, thus showing that the quality of the grain of the A series was superior to that of the B series. If the yields of the past three years be contrasted with those of 1890-91 and 1891-92, in which the rainfall of October and November was comparatively light, it will be observed that the effect of the manures applied on the outturns has most markedly declined, the reason for which must apparently be sought in the fact that the state of the ground was unfavourable for proper nitrification, and the manures therefore remained in the soil in an unavailable condition.

FIELD NO. 18.—SUBJECT.—*Relative effect of green manuring, box-dung and stall-dung on wheat grown continuously.*

Plot 1.—Area 0·25 acre. Green manured with Bawachi, *Psorolia Corilifolia*, every year.
„ 2. „ 0·25 „ Unmanured.
„ 3. „ 0·25 „ Manured with box-dung at 240 maunds per acre.
„ 4. „ 0·25 „ Manured with stall-dung at 160 maunds per acre.
Commenced in 1890-91. Unirrigated. Crop, wheat (haura) Nagpur.

| No. of plot. | Outturn per acre. 1890-91. Grain. | 1890-91. Straw. | 1891-92. Grain. | 1891-92. Straw. | 1892-93. Grain. | 1892-93. Straw. | 1893-94. Grain. | 1893-94. Straw. | 1894-95. Grain. | 1894-95. Straw. | 1894-95. Value. | Cost of cultivation per acre. | Cost of manuring per acre. | Gain in value on plot 2. | Average for five years. Outturn per acre. Grain. | Straw. | Value. | Gain in value on plot 7. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | lbs. | lbs. | Rs. a. p. | Rs. a. p. |
| I | 734 | 1,185 | 368 | 486 | 764 | 1,101 | 720 | 1,060 | 384 | 556 | 13 8 11 | 8 14 4 | 5 13 8 | 2 14 3 | 594 | 878 | 21 7 3 | 4 1 5 |
| II | 612 | 962 | 386 | 503 | 655 | 880 | 416 | 812 | 297 | 479 | 10 10 8 | 9 13 8 | ... | ... | 473 | 727 | 17 5 10 | ... |
| III | 681 | 1,158 | 415 | 542 | 919 | 1,796 | 760 | 1,508 | 512 | 892 | 18 10 0 | 9 10 0 | 11 15 4 | 7 15 4 | 657 | 1,179 | 24 6 11 | 7 1 1 |
| IV | 837 | 1,029 | 435 | 627 | 774 | 1,187 | 600 | 936 | 475 | 613 | 16 7 11 | 10 4 4 | 11 8 0 | 5 13 3 | 624 | 878 | 22 8 5 | 5 2 7 |

Plot No. 1 was sown with *Psorolia Corolifolia*, a papilionaceous weed which grows all over the Farm. Its seed was collected in waste places and was sown on 13th June 1894, at the rate of 120 lbs. per acre, after the plot had received one bakhering. The plants were ploughed in on 12th August. Plot No. 3 was manured with box-dung on the 4th June. Plot No. 4 was manured with stall-dung on the 2nd June. Wheat was sown at the rate of 90 lbs per acre on the 14th October in all the plots. The seeds germinated well, but the heavy rain at the end of October and in the beginning of November damaged the crop so much that I was obliged to resow the fields on the 18th November. The crop was reaped on the 4th March 1895, and the yields both of grain and straw were very poor. In the Nagpur country the hot weather sets in very soon and wheat has not time to attain to full maturity unless it is sown early. However, the results of the three manured plots 1, 3 and 4, when compared with those of plot No. 2 which was unmanured, afford no contradiction of the preceding year's experience teaching the relative values of the manures.

FIELD No. 32.—SUBJECT.—*Effect on wheat of green manuring with cut papilionaceous weeds, Bawachi (Psorolia Corolifolia) collected from waste land.*

Plot 1.—Area 0·16 acre. Annually green manured with Bawachi.
„ 2. „ 0·16 „ Unmanured.
Commenced in 1891-92. Unirrigated. Crop, wheat (haura) Nagpur.

| No. of plot. | Outturn per acre. | | | | | | | | | Cost of cultivation. | Cost of green soiling. | Gain in value on plot 2. | Total from commencement of Experiment (four years). | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1891-92. | | 1892-93. | | 1893-94. | | 1894-95. | | | | | | Cost of cultivation, including green soiling. | Value of produce per acre. |
| | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Value. | | | | | |
| | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. |
| I | 570 | 917 | 1,136 | 1,833 | 787 | 1,356 | 528 | 1,516 | 21 6 3 | 10 0 5 | 7 6 3 | 1 10 2 | 88 8 7 | 111 10 3 |
| II | 483 | 767 | 714 | 923 | 462 | 850 | 466 | 1,578 | 19 12 1 | 10 2 0 | ... | ... | 39 10 10 | 79 0 3 |

In this field the seed *Psorolia Corolifolia* was not sown as in the case of plot No. 1, field No. 18, but was uprooted from waste places and carted to the field. During the year under report the weeds were buried on the 14th of August at the rate of 83 maunds per acre. Wheat was sown in both the plots on the 16th of October; but as the seedlings were damaged by rain the plots were resown on the 17th of November. It will be seen from the above table that plot No. 1 which was green manured gave a larger outturn than plot No. 2 but the expenses (Rs. 7-6-3) incurred in cutting and carting the weed brought in a profit of only Rs. 1-10-2. The season was, however, unfavourable for this like most other experiments, and the result of resowing the fields was to leave an inadequate period for the crop to avail itself of the manure applied.

In previous seasons better results have been obtained and speaking generally the experiment is a promising one.

FIELD No. 68.—SUBJECT.—*Effect on irrigated wheat of manuring with saltpetre at different rates per acre.*

Plot 1.—Area 0·10 acre. Unmanured.
„ 2. „ 0·10 „ Manured with saltpetre at 240 lbs. per acre drilled in with seed.
„ 3. „ 0·10 „ Manured with saltpetre 80 lbs. per acre drilled in with seed.
Commenced in 1890-91. Once irrigated on 21st and 22nd January 1895. Crop wheat (baura) Nagpur.

| No. of plot. | Outturn per acre. | | | | | | | | | | | Cost of cultivation. | Cost of manuring. | Gain in value on plot 1. | Cost of Irrigation. | | Average for five years. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1890-91. | | 1891-92. | | 1892-93. | | 1893-94. | | 1894-95. | | | | | | Labour. | Assumed water-rate per acre of watering. | Outturn per acre. | | | Gain in value on plot 1. |
| | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Value. | | | | | | Grain. | Straw. | Value. | |
| | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | lbs. | lbs. | Rs. a. p. | Rs. a. p. |
| I | 525 | 1,075 | 855 | 1,005 | 405 | 1,685 | 457 | 990 | 550 | 910 | 19 13 4 | 13 2 0 | ... | ... | 1 2 4 | 2 0 0 | 558 | 1,133 | 20 15 5 | ... |
| II | 1,227 | 3,275 | 1,405 | 1,665 | 640 | 1,940 | 569 | 1,145 | 845 | 1,215 | 29 12 9 | 13 3 8 | 20 3 4 | 9 15 5 | 1 14 10 | 2 0 0 | 937 | 1,848 | 34 13 1 | 13 13 8 |
| III | 567 | 1,135 | 835 | 945 | 235 | 1,185 | 437 | 600 | 627 | 732 | 21 7 10 | 12 6 4 | 6 11 6 | 1 10 6 | 1 14 10 | 2 0 0 | 540 | 919 | 19 9 11 | —1 5 6 |

A slight change has been made in the application of manure in plot No. 3. I mentioned in my report for last year that this plot gave a smaller outturn than even the unmanured plot No. 1. It must be owing either to the natural inferiority of the soil of the plot, or that the saltpetre applied as a top dressing never became really available for the benefit of the crop. It was therefore manured with saltpetre drilled in with the seed just as in plot No. 2, the same quantity of saltpetre being used as in the last year. Wheat was resown on the 17th November and reaped on the 12th March. It was irrigated on the 21st and 22nd January 1895.

The outturns of the manured crops are not very satisfactory. Plot No. 3 this year gave a somewhat better outturn than the unmanured plot.

FIELDS NOS. 15 AND 22.—SUBJECT.—*The effect of manuring wheat at different times of the year*, i. e., *June and August*.

Field No. 15—

Plot 1.—Area 0·23 acre. Manured with 160 maunds dung in June.

„ 2. Area 0·23 acre. Manured with 160 maunds dung in August.

Field No. 22—

Plot 1.—Area 0·28 acre. Manured with 160 maunds dung in June.

„ 2. Area 0·28 acre. Manured with 160 maunds dung in August.

„ 3. Area 0·28 acre. Manured with 160 maunds dung in August.

| No. of plot. | No. of field. | Area. | Treatment in year under report. | | Outturn per acre. | | | Cost of cultivation per acre. | Cost of manure per acre. |
|---|---|---|---|---|---|---|---|---|---|
| | | | Crop. | Manure. | Grain. | Straw. | Value. | | |
| | | Acres. | | | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. |
| I | 15 | 0·23 | Wheat (haura) ... | Manured with 160 maunds dung in June 1894. ... | 393 | 507 | 13 10 4 | 9 11 10 | 11 3 4 |
| II | | 0·23 | Do. ... | Do. in August 1894 ... | 437 | 762 | 15 14 5 | 9 12 11 | 11 15 4 |
| I | 22 | 0·28 | Do. ... | Do. in June 1894 ... | 541 | 1,037 | 20 0 5 | 10 5 6 | 11 15 8 |
| II | | 0·28 | Do. ... | Do. in August 1894 ... | 691 | 961 | 24 3 11 | 11 5 7 | 12 10 8 |
| III | | 0·28 | Do. ... | Do. do. ... | 618 | 825 | 21 9 5 | 10 0 1 | 11 10 4 |

The above experiment was conducted in two fields Nos. 15 and 22. The usual practice among cultivators is to manure their fields in June. Having observed that the heavy rainfall of the monsoon washes away the soluble particles of the manure into the drains, I devised an experiment of manuring one set of plots as usual in June while I delayed manuring the corresponding plots till August. The manure was weighed for all the plots in June and in plot No. 1 of field Nos. 15 and 22 it was spread on the 4th June and the fields were bakhared the same day. On the same day the manure was carted and stored in heaps on high ground in plot No. 2 of field No. 15 and in plots Nos. 2 and 3 of field No. 22. To protect the manure from the rain, the heaps were covered up with a layer of dry grass one inch thick over which was spread a layer of earth about the same thickness. These heaps were spread over the plots on the 29th of August and at once bakhared. The first sowings failed owing to the excessive rainfall, and it was therefore necessary to resow wheat on the 16th of November and the crop was reaped on the 3rd and 5th of March. Plot No. 2 of field No. 15, which was manured in August, gave an increase in produce of 44 lbs. over plot No. 1 of the same field. Plots Nos. 2 and 3 of field No. 22 which were both manured in August gave an increase in produce over plot No. 1 of the same field amounting to 150 and 77 lbs., respectively. This being the first year of the experiment, no definite conclusions can be drawn. The experiment will be repeated next year.

VILLE SERIES.—SUBJECT.—*Practical method of soil analysis by using chemical manures, as devised by Mr. George Ville.*

Plot 1.—Area 0·05 area. Manured with Ammonic chloride at 140 lbs. per acre.
„ Calcic superphosphate at 180 lbs. per acre.
„ Potassic sulphate at 90 lbs. per acre.
„ Calcic sulphate at 100 lbs. per acre.

„ 2. „ 0·05 „ „ As above, less calcic superphosphate.

„ 3. „ 0·05 „ „ As in plot 1, less ammonic chloride.

„ 4. „ 0·05 „ „ No manure.

„ 5. „ 0·05 „ „ As in plot 1, less potassic sulphate.

„ 6. „ 0·05 „ „ As in Plot 1, less calcic sulphate.

Commenced in 1890-91. Unirrigated. Crop, wheat (Nagpur haura) in year under report.

| No. of plot. | Outturn per acre. | | | | | | | | | | | Gain in value on plot 4. | Average for five years. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1890-91. | | 1891-92. | | 1892-93. | | 1893-94. | | 1894-95. | | | | Outturn per acre. | | | Gain in value on plot 4. |
| | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Value. | | Grain. | Straw. | Value. | |
| | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | lbs. | lbs. | Rs. a. p. | Rs. a. p. |
| I | 1,435 | 2,845 | 1,230 | 2,290 | 480 | 2,680 | 786 | 1,129 | 652 | 1,067 | 23 7 5 | 6 3 9 | 917 | 2,002 | 36 12 0 | 17 1 8 |
| II | 1,270 | 2,605 | 1,500 | 2,460 | 325 | 2,495 | 799 | 1,150 | 870 | 1,510 | 31 10 0 | 14 6 4 | 953 | 2,044 | 38 5 0 | 18 10 8 |
| III | 805 | 1,910 | 710 | 1,190 | 105 | 975 | 430 | 540 | 465 | 655 | 16 5 6 | —0 14 2 | 503 | 1,054 | 20 4 1 | 0 9 9 |
| IV | 765 | 1,610 | 710 | 1,290 | 130 | 890 | 374 | 485 | 482 | 757 | 17 3 8 | ... | 492 | 1,006 | 19 10 4 | 18 7 3 |
| V | 1,455 | 2,920 | 1,440 | 2,360 | 535 | 2,345 | 606 | 1,120 | 740 | 1,100 | 26 3 7 | 8 15 11 | 955 | 1,969 | 38 1 7 | ... |
| VI | 1,270 | 2,865 | 1,240 | 2,140 | 415 | 2,365 | 782 | 1,040 | 735 | 925 | 25 7 0 | 8 3 4 | 888 | 1,867 | 35 6 0 | 15 11 8 |

At the beginning of the year under report it was proposed by Dr. Leather that the crop of this series should be linseed. Linseed was accordingly sown on the 17th October and was so seriously damaged by the rains which fell at the end of that month and at the beginning of November that the plot had to be resown with wheat on the 25th November as the time for sowing linseed had passed away. This year I will try to sow linseed in this series. The present site is very much water-logged, and it is not possible to sow such a crop as linseed in a field like this. The site has accordingly been changed.

## IV.—ROTATION EXPERIMENTS.

Rotation.

6. Three distinct fields have been allotted for the conduct of experiments in rotation.

The object of these experiments is to test the native practices observed by the cultivators of these Provinces and to see whether there is any practical possibility of improving them. In field No. 29 wheat is followed by fallow and gram, &c. In field No. 57 linseed is followed by cotton and other crops. In field No. 61 cotton-tur is followed by wheat and gram. The most important of these experiments are those conducted in fields 29 and 57. Experiments in fields Nos. 29 and 57 were started four years ago while the experiment in field No. 61 began in 1893-94.

The results which have been obtained in the case of each of these plots are tabulated below and are compared with those of previous years:—

FIELD No. 29.—SUBJECT.—*Effect of rotation with wheat.*

Plot 1.—Area 0·13 acre. Wheat every year.
„ 2. „ 0·13 „ Wheat and fallow alternately.
„ 3. „ 0·13 „ Wheat and gram alternately.
„ 4. „ 0·13 „ Wheat and juar and tur alternately.
„ 5. „ 0·13 „ Wheat and Kodon (*Paspalum scrobiculatum*).

Commenced in 1890-91. Unmanured and unirrigated. Crop, wheat (Nagpur haura), in year under report throughout all the plots.

| No. of plot. | Crop. | OUTTURN PER ACRE. | | | | | | | | | | Value. | Cost of cultivation. | Total outlay in cultivation per acre since commencement of experiment (5 years). | Total value of produce per acre since commencement of experiment (5 years). | Total profit per acre since commencement of experiment (5 years). |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1890-91. | | 1891-92. | | 1892-93. | | 1893-94. | | 1894-95. | | | | | | |
| | | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | | | | | |
| | | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. |
| I | Wheat | 604 | 1,134 | 467 | 409 | 689 | 1,680 | 607 | 762 | 523 | 815 | 18 10 9 | 8 14 11 | 42 15 11 | 110 4 2 | 67 4 3 |
| II | Wheat | 515 | 1,102 | ... | ... | 598 | 1,643 | ... | ... | 800 | 1,269 | 28 10 4 | 9 9 10 | 29 3 7 | 75 11 2 | 46 7 7 |
| | Fallow | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | | | | | |
| III | Wheat | 537 | 1,066 | ... | ... | 533 | 1,574 | ... | ... | 635 | 1,035 | 22 13 6 | 9 0 10 | 41 10 4 | 96 12 4 | 55 2 0 |
| | Gram | ... | ... | 351 | 334 | ... | ... | 538 | 1,346 | ... | ... | | | | | |
| IV | Wheat | 539 | 1,087 | ... | ... | 666 | 1,763 | ... | ... | 753 | 1,106 | | | | | |
| | Juar | ... | ... | 128 | 2,721 | ... | ... | 200 | 1,735 | ... | ... | 15 6 2 | 9 12 5 | 46 14 3 | 128 0 11 | 81 2 8 |
| | Tur | ... | ... | 163 | 383 | ... | ... | 356 | 1,100 | ... | ... | | | | | |
| V | Wheat | ... | ... | ... | ... | 760 | 1,667 | ... | ... | 693 | 1,138 | 24 15 4 | 9 7 11 | 44 7 6 | 76 11 7 | 32 4 1 |
| | Kodon | ... | ... | 199 | 942 | ... | ... | 600 | 335 | ... | ... | | | | | |

Wheat was sown on the 14th of October; a little portion on the south side of each plot was damaged by the rains. A strip was therefore resown with wheat in all the plots in order to equalize the results. Of course the grains of the early sown wheat were more plump than those late sown. Plot No. 2 gave the largest outturn, but it will be observed by referring to the last column of the table above that to keep a plot fallow is not remunerative, as the total profit per acre since the commencement of the experiment is Rs. 46-7-7 only. Plot No. 4 in which wheat is rotated with juar and tur gave the largest profit, and in the current year's yield per acre of wheat it stands next to fallow. Plot No. 3 rotated with gram and wheat stands third in the point of profit, but fourth in point of yield. The 5th plot though it stands third in point of outturn of wheat per acre yields the least profit of all. The small demand for kodo in the Nagpur country accounts for this. In Chhattisgarh where kodo is a staple largely consumed by the poorer classes, the rotation of wheat with kodo-tur is the system ordinarily pursued.

FIELD NO. 57.—SUBJECT.—*Rotations with linseed.*

Plot 1.—Area 0·28 acre. Linseed every year.
„ 2. „ 0·28 „ Linseed and gram alternately.
„ 3. „ 0·28 „ Linseed and cotton alternately.
„ 4. „ 0·28 „ Linseed and tur alternately.
Commenced in 1890-91. Unmanured and unirrigated. Crop, linseed (*chaval-katha) in year under report.

| No. of plot. | Crop. | OUTTURN PER ACRE. | | | | | | | | | | | | Total outlay in cultivation since commencement of experiment. | Total value of produce per acre since commencement of experiment (6 years.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1890-91. | | 1891-92. | | 1892-93. | | 1893-94. | | 1894-95. | | | | | |
| | | Seed. | Stalks. | Grain or lint. | Straw or seed. | Seed. | Stalks. | Grain or lint. | Straw or seed. | Seed. | Stalks. | Value. | Cost of cultivation. | | |
| | | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. |
| I | Linseed | 129 | 389 | ... | ... | ·22 | 4 | 11 | 36 | 21 | 43 | 1 6 3 | 5 2 2 | 28 7 7 | 10 5 10 |
| II | Linseed | 82 | 218 | ... | ... | ·22 | 2 | ... | ... | 41 | 73 | 2 10 9 | | | |
| | and Gram | ... | ... | 83 | 181 | ... | ... | 473 | 652 | ... | ... | | 5 5 8 | 33 6 9 | 25 2 11 |
| III | Linseed | 81 | 289 | ... | ... | ·22 | 2 | ... | ... | 24 | 54 | 1 9 8 | | | |
| | and Cotton | ... | ... | 43 | 112 | ... | ... | 24 | 62 | ... | ... | | 6 1 11 | 33 0 7 | 24 8 3 |
| IV | Linseed | 99 | 332 | ... | ... | ·22 | 3 | ... | ... | 40 | 95 | 2 11 0 | | | |
| | and Tur | ... | .. | 550 | 1,132 | ... | ... | 684 | 2,168 | ... | ... | | 5 12 7 | 37 2 4 | 43 15 6 |

* White ⅓ and red ⅔ (chaval-katha).

Linseed was sown on the 4th October. As the linseed crop suffered from rust throughout the whole of the Farm, the results are not worth examination. It may be remarked however, that plot No. 1, where linseed is sown year after year, gave the poorest outturn. Here again the plot on which tur is sown in rotation is the most remunerative. As remarked in previous reports, tur is the crop which has hitherto done best on the Farm.

FIELD NO. 61.—SUBJECT.—*Rotations with cotton and tur.*

Plot 1.—Area 0·30 acre. Cotton-tur year after year.
„ 2. „ 0·30 „ Cotton-tur in rotation with wheat.
„ 3. „ 0·30 „ Cotton-tur in rotation with gram.
Commenced in 1893-94. Unmanured and unirrigated. For cropping see column 5 below.

| No. of plot. | OUTTURN PER ACRE. | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1893-94. | | | 1894-95. | | | |
| | Crop. | Grain or lint. | Straw or seed. | Crop. | Grain or lint. | Straw or seed. | Value. | Cost of cultivation. |
| | | lbs. | lbs. | | lbs. | lbs. | Rs. a. p. | Rs. a. p. |
| I | Cotton | 21 | 41 | Cotton | 12 | 31 | 13 14 7 | 11 6 3 |
| | and Tur | 590 | 1,943 | and Tur | 404 | 832 | | |
| II | Cotton | 27 | 52 | | | | | |
| | and Tur | 613 | 1,960 | Wheat | 663 | 1,010 | 23 9 5 | 12 1 1 |
| III | Cotton | 33 | 51 | | | | | |
| | and Tur | 630 | 1,980 | Gram | 523 | 837 | 17 5 11 | 9 5 2 |

Plot No. 1 was sown with cotton and tur. The cotton crop was a failure, owing to heavy rains, and the tur crop was damaged owing to the tur stalks having withered before reaching the flowering stage. I examined the roots by digging out the plants but I found no trace of white-ants. I mentioned this fact to Dr. Watt, Reporter on Economic Products to the Government of India, while touring with that officer in the Nagpur and Wardha Districts. Dr. Watt advised me to sprinkle the plants which were on the point of fading, with a decoction of *Adhatoda vascia* (Marathi Adulsa and Bengali Basanti). I tried this also but without effect. Plot No. 2 was sown with wheat on the 15th October and reaped on the 10th February. The outturn is fair. The outturns of plot No. 3 are also not bad. This being only the second year of the experiment, there is very little to remark, but by comparing the outturn of wheat with that of experiments in other plots, the wheat crop seems to have profitted by a rotation with cotton.

## V.—EXPERIMENTS IN MANURE AND ROTATION.

Manure and Rotation.

7. There are six fields in which experiments in manure and rotation are tried.

In fields Nos. 14 and 17 the experiment is designed to bring out the advantage of green soiling on a rotation of wheat and cotton. In the other fields the effect of the various manures—stall-dung, box-dung, bone-dust, and lime was tested on the following crops grown in rotation :—

Juar and Linseed. Cotton and Wheat. Linseed and Cotton.

The results which have been obtained this year in the case of each of these experiments are contrasted below with those of previous years :—

FIELD NO. 14.—SUBJECT.—*Effect of green manuring with san hemp (Crotoluria juncea) on wheat with fallow interposed and on wheat in rotation with cotton.*

Plot 1.—Area 0·18 acre. Crop, wheat.
„ 2. „ 0·18 „ Do.
„ 3. „ 0·18 „ Crop, cotton (jari).
„ 4. „ 0·21 „ Do.
Commenced in 1891-92. No green manuring in year under report.

| No. of plot. | Crop. | Outturn per acre. 1891-92. Grain or lint. | 1891-92. Straw or seed. | 1892-93. Grain or lint. | 1892-93. Straw or seed. | 1893-94. Grain or lint. | 1893-94. Straw or seed. | 1894-1895. Grain or lint. | 1894-1895. Straw or seed. | Cost of cultivation. | Value of produce. | Total from commencement of experiment (4 years). Cost of cultivation including green manuring. | Value of produce. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. |
| I | Wheat. | ... | ... | 911 | 1,705 | ... | ... | 483 | 683 | 9 11 6 | 16 15 10 | 50 9 2 | 53 6 6 |
| II | Do. | ... | ... | 829 | 1,076 | ... | ... | 356 | 372 | 9 10 8 | 12 0 2 | 31 14 0 | 43 6 6 |
| III | Wheat. | 411 | 805 | ... | ... | 678 | 1,378 | ... | ... | 10 9 7 | 7 1 3 | 64 14 6 | 78 7 2 |
| | Cotton. | ... | ... | 89 | 225 | ... | ... | 26 | 67 | | | | |
| IV | Wheat. | 371 | 638 | ... | ... | 687 | 1,419 | ... | ... | 11 7 4 | 5 12 2 | 46 11 4 | 72 3 11 |
| | Cotton. | ... | ... | 79 | 207 | ... | ... | 21 | 57 | | | | |

The above experiment is a double one. One pair of plots is fallow in the year of green manuring and bears wheat in the following year. The other pair grows wheat after the green manuring followed by cotton in the next kharif season. Comparing the outturns of plots Nos. 1 and 2, both of which were fallow in the previous year, we find an advantage of 127 lbs. in favour of the manured plot. The outturn of cotton was exceptionally poor owing to the unfavourable nature of the season. The experiment will be continued.

FIELD NO. 17.—SUBJECT.—*Effect on wheat and cotton in rotation on green manuring with* (bawachi) *a papilionaceous weed* (*Psorolia corilifolia*).

Plot 1.—Area 0·15 acre. Green manured with cut weeds every alternate year.
„ 2. „ 0·08 „ No manure.
Both plots cropped with cotton and wheat alternately. Wheat in the year of green manuring.
Commenced in 1890-91. Unirrigated. Crop, wheat (Nagpur haura) in year under report.

| No. of plot. | Crop. | Outturn per acre. 1890-91. Grain. | 1890-91. Straw. | 1891-92. Lint. | 1891-92. Seed. | 1892-93. Grain. | 1892-93. Straw. | 1893-94. Lint. | 1893-94. Seed. | 1894-95 Grain. | 1894-95 Straw. | Cost of cultivation. | Cost of green manuring. | Value of produce. | Total from commencement of experiment (5 years.) Cost of cultivation including green manuring. | Value of produce. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. |
| I | Wheat. | 665 | 1,239 | ... | ... | 492 | 1,635 | ... | ... | 550 | 863 | 10 12 2 | 8 9 9 | 19 10 7 | 92 3 2 | 93 7 6 |
| | Cotton. | ... | ... | 67 | 163 | ... | ... | 49 | 120 | ... | ... | | | | | |
| II | Wheat. | 443 | 722 | ... | ... | 275 | 1,200 | ... | ... | 324 | 525 | 13 13 10 | ... | 11 10 3 | 69 6 5 | 61 13 9 |
| | Cotton. | ... | ... | 46 | 119 | ... | ... | 40 | 105 | ... | ... | | | | | |

The experiments conducted year after year in plots 1 and 2 of field No. 17 are the same as those conducted in plots Nos. 3 and 4 of field No. 14, with this difference that the crop ploughed into field No. 14 is san hemp (*Crotolaria juncea*), while in field No. 17 the green manuring is with (Bawachi) *Psorolia corilifolia*. By comparing the cost of cultivation and the cost of green manuring with that of the value of the outturns from the commencement of the experiment,

green manuring though not very profitable occasions no loss in plot No. 1. Plot No. 2 shows a clear loss of at least Rs. 8 in the course of five years. The poor agricultural seasons of the past few years have obscured the results of most experiments and no definite conclusions can be drawn. The experiment will be repeated.

FIELD NO. 42.—SUBJECT—*Relative effect of dung and bone-dust applied each year on juar and linseed grown in rotation.*

Plot 1.—Area 0·27 acre. Manured with dung at 160 maunds per acre.
„ 2. „ 0·27 „ Unmanured.
„ 3. „ 0·27 „ Manured with bone-dust at 360 lbs. per acre.
Commenced in 1890-91. Unirrigated. Crop, juar, in year under report.

| No. of plot | Crop. | Outturn per acre. 1890-91. Grain. | 1890-91. Fodder. | 1891-92. Seed. | 1891-92. Stalks. | 1892-93. Grain. | 1892-93. Fodder. | 1893-94. Seed. | 1893-94. Stalks. | 1894-95. Grain. | 1894-95. Fodder. | 1894-95. Value. | Cost of cultivation. | Cost of manure. | Gain in value of plot No. 2. | Average for five years. Cost of cultivation including manure per acre. | Average for five years. Value of produce per acre. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p | Rs. a. p. | Rs. a. p. | Rs. a. p. |
| I | Juar ... | 229 | 1,829 | ... | ... | 368 | 2,508 | ... | ... | 156 | 1,370 | 13 14 5 | *5 14 5 | 11 15 4 | 7 10 5 | 17 4 10 | 13 9 3 |
| | Linseed ... | ... | ... | 109 | 209 | ... | ... | 115 | 352 | ... | ... | | | | | | |
| II | Juar ... | 158 | 1,821 | ... | ... | 322 | 1,616 | ... | ... | 60 | 652 | 6 4 0 | *5 12 0 | ..... | ..... | 6 6 2 | 10 2 7 |
| | Linseed ... | ... | ... | 78 | 145 | ... | ... | 122 | 254 | ... | ... | | | | | | |
| III | Juar ... | 145 | 1,750 | ... | ... | 355 | 1,692 | ... | ... | 51 | 622 | 5 12 10 | *5 12 7 | 3 8 6 | −0 7 2 | 9 12 1 | 10 6 0 |
| | Linseed ... | ... | ... | 91 | 164 | ... | ... | 126 | 228 | ... | ... | | | | | | |

* Excluding cost of watching juar.

Juar was sown in all the plots on the 3rd July 1894. Owing to the heavy rains, the crop was a very poor one throughout the Farm, as will be seen by comparing the outturns of the year under report with those of the years 1892-93 and 1890-91; but I may remark that dung added considerably to the value of the crop though not in proportion to its cost. Bone-dust failed entirely in producing the desired effect.

FIELD NO. 44.—SUBJECT.—*Relative effect on cotton and wheat in rotation of box-dung, stall-dung and bone-dust.*

Plot 1.—Area 0·27 acre. Manured with stall-dung at 160 maunds per acre.
„ 2. „ 0·27 „ „ box-dung at 240 maunds per acre.
„ 3. „ 0·27 „ Unmanured.
„ 4. „ 0·27 „ Manured with bone-dust at 360 lbs. per acre.
Commenced in 1890-91. Unirrigated. Crop, cotton, in year under report.

| No. of plot | Crop. | Outturn per acre. 1890-91. Lint. | 1890-91. Seed. | 1891-92. Gram. | 1891-92. Straw. | 1892-93. Lint. | 1892-93. Seed. | 1893-94. Gram. | 1893-94. Straw. | 1894-95. Lint. | 1894-95. Seed. | 1894-95. Value. | Cost of cultivation. | Cost of manure. | Gain in value on plot 3. | Average for five years. Cost of cultivation including manure per acre. | Average for five years. Value of produce per acre. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. |
| I | Cotton. | 46 | 69 | ... | ... | 48 | 147 | ... | ... | 39 | 103 | 10 10 5 | 9 0 2 | 13 10 10 | 8 7 9 | 20 13 10 | 14 8 9 |
| | Wheat. | ... | ... | 307 | 432 | ... | ... | 724 | 1,363 | ... | ... | | | | | | |
| II | Cotton. | 59 | 88 | ... | ... | 61 | 174 | ... | ... | 56 | 149 | 15 5 0 | 9 6 4 | 14 10 1 | 13 2 4 | 21 15 0 | 18 4 5 |
| | Wheat. | ... | ... | 291 | 409 | ... | ... | 995 | 1,507 | ... | ... | | | | | | |
| III | Cotton. | 42 | 68 | ... | ... | 25 | 70 | ... | ... | 8 | 20 | 2 2 8 | 6 3 8 | ..... | ..... | 8 2 2 | 8 8 6 |
| | Wheat. | ... | ... | 237 | 332 | ... | ... | 462 | 596 | ... | ... | | | | | | |
| IV | Cotton. | 43 | 69 | ... | ... | 24 | 68 | ... | ... | 6 | 15 | 1 10 0 | 6 1 6 | 3 6 0 | −0 8 8 | 11 12 3 | 7 7 7 |
| | Wheat. | ... | ... | 217 | 309 | ... | ... | 352 | 464 | ... | ... | | | | | | |

Cotton was sown in all the plots on the 20th June 1894. The cotton crop of the year yielded a very poor outturn, the fields being reduced to a swampy state by the heavy rain. However, the good effect of box-dung in plot No. 2 is very noticeable. Bone-dust added nothing; but it is very striking that plot No. 4 never shows better results than plot No. 3, which is an unmanured plot. Bone-dust perhaps may not increase the outturn of a crop, but it is strange that it should diminish the yield. Plots Nos. 3 and 4 are even, and should be equally fertile.

FIELD NO. 63.—SUBJECT.—*Relative effect on linseed and cotton in rotation of box-dung and stall-dung applied in alternate years only.*

Plot 1.—Area 0·30 acre. Manured with box-dung at 240 maunds per acre.
„ 2. „ 0·30 „ Unmanured.
„ 3. „ 0·30 „ Manured with stall-dung at 160 maunds per acre.
Commenced in 1890-91. Unirrigated. Crop, linseed, in year under report.

| No. of plot. | Crop. | Outturn per acre. | | | | | | | | | | | | | | Average for five years. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1890-91. | | 1891-92. | | 1892-93. | | 1893-94. | | 1894-95. | | | Cost of cultivation. | Cost of manure. | Gain in value on plot 2. | Cost of cultivation including manure per acre. | Value of produce per acre. |
| | | Seed. | Stalks. | Lint. | Seed. | Seed. | Stalks. | Lint. | Seed. | Seed. | Stalks. | Value. | | | | | |
| | | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. |
| I | Linseed ... | 235 | 674 | ... | ... | 12 | 43 | ... | ... | 14 | 52 | 1 0 0 | 7 13 3 | 12 15 6 | −0 0 1 | 17 0 3 | 7 11 3 |
| | Cotton ... | ... | ... | 33 | 101 | ... | ... | 47 | 147 | ... | ... | | | | | | |
| II | Linseed ... | 291 | 781 | ... | ... | 2 | 10 | ... | ... | 15 | 35 | 1 0 1 | 7 2 0 | ..... | ..... | 8 12 11 | 7 2 4 |
| | Cotton ... | ... | ... | 38 | 106 | ... | ... | 24 | 69 | ... | ... | | | | | | |
| III | Linseed ... | 363 | 935 | ... | ... | 5 | 22 | ... | ... | 15 | 38 | 1 0 3 | 7 13 3 | 11 8 6 | +0 0 2 | 14 0 1 | 8 13 2 |
| | Cotton ... | ... | .. | 37 | 111 | ... | ... | 39 | 124 | ... | ... | | | | | | |

These plots abound with the weed known as Nagarmotha (*cyperus pertennis*) which is very difficult to eradicate. Manures have made no impression on the outturn of linseed, but have exerted a slightly beneficial effect on cotton. With even favourable seasons, more conclusive results are anticipated.

FIELD NO. 65.—SUBJECT.—*Effect of liming soils on wheat in rotation with cotton.*

Plot 1.—Area 0·43 acre. Manured with lime in 1890-91 (not to be limed again until 1902-03).
„ 2. „ 0·43 „ Not manured with lime.
Commenced in 1890-91. Unirrigated, but both plots are manured with dung in 1893-94.
Crop, wheat (haura), in year under report.

| No. of plot. | Crop. | Outturn per acre. | | | | | | | | | | | | | | Average for five years. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1890-91. | | 1891-92. | | 1892-93. | | 1893-94. | | 1894-95. | | | Cost of cultivation. | Cost of manure. | Gain in value on plot No. 2. | Cost of cultivation including manure per acre. | Value of produce per acre. |
| | | Grain. | Straw. | Lint. | Seed. | Grain. | Straw. | Lint. | Seed. | Grain. | Straw. | Value. | | | | | |
| | | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. |
| I | Wheat ... | 647 | 990 | ... | ... | 517 | 1,124 | ... | ... | 507 | 833 | 18 4 1 | 9 1 11 | 7 1 10 | −1 6 10 | 19 15 11 | 15 15 9 |
| | Cotton ... | ... | ... | 56 | 144 | ... | ... | 12 | 40 | ... | ... | | | | | | |
| II | Wheat ... | 562 | 1,485 | ... | ... | 533 | 1,195 | ... | ... | 533 | 1,009 | 19 10 11 | 9 0 7 | ..... | ..... | 12 8 8 | 16 6 5 |
| | Cotton ... | ... | ... | 55 | 134 | ... | ... | 9 | 30 | ... | ... | | | | | | |

Wheat was sown in both the plots on the 15th October and was reaped on the 11th February. It was necessary to resow the fields as was the case in the other plots. The outturns of both the plots are fair for the season. It will be observed that in the year of liming the plot manured gave the larger outturn of wheat, but since then the unlimed plot has given a larger yield than that limed. The results of future years will be awaited with interest.

## VI.—EXPERIMENTS WITH MIXTURES OF CROPS.

Mixtures of crops.

8. These experiments were started with the object of testing the expediency of the practice of cultivators of the Province. There are two fields allotted for conducting these experiments.

The experiment in field No. 25 of mixing gram and wheat known in the Nerbudda valley as "birra" was commenced in 1890-91; while the experiments of mixing (1) juar and cotton and (2) cotton and tur in field No. 23 was commenced in 1893-94. The results are given in the tables below:—

FIELD No. 23.—SUBJECT.—*Effect of mixing crops, the principal one being cotton.*

Plot 1.—Area 0·30 acre. Cotton jari alone.
„ 2. „ 0·30 „ Cotton jari and tur in the proportion of 6 lines to 2.
„ 3. „ 0·30 „ Cotton jari and juar, in proportion of 6 lines to 2.
Commenced in 1893-94.

| No. of plot. | Crop. | Outturn per acre. | | | | | Cost of cultivation. | Gain in value on produce. |
|---|---|---|---|---|---|---|---|---|
| | | 1893-94. | | 1894-95. | | | | |
| | | Grain or lint. | Straw or seed. | Grain or lint. | Straw or seed. | Value. | | |
| | | lbs. | lbs. | lbs. | lbs. | Rs. a p. | Rs. a. p. | Rs. a. p. |
| I | Cotton ... | 44 | 85 | 11 | 26 | 2 2 1 | 13 3 11 | ... .. |
| II | Cotton ... | 27 | 52 | 11 | 21 | 13 7 1 | 11 1 9 | 11 5 0 |
| | Tur ... | 658 | 1,237 | 372 | 928 | | | |
| III | Cotton ... | 22 | 46 | 14 | 33 | 3 14 2 | *9 7 11 | 1 12 1 |
| | Juar ... | 41 | 673 | ... | 163 | | | |

* Excluding cost of watching.

The crops, cotton, tur and juar, were sown on the 18th June. As the season for both juar and cotton was unfavourable, the outturn will not repay contrast. The field itself is not suitable for any experiment with kharif crops, hence it has been resolved that the experiment should be transferred to field No. 55, which is not water-logged. Against plot No. 3 the outturn of juar is returned as *nil*. When the crop was about to flower it was ruined by excessive rain, which converted the field into a swamp. The karbi (stalks) was so damaged that the cattle refused to eat it.

FIELD No. 25.—SUBJECT.—*Effect of mixing crops, wheat and a leguminous crop (gram).*

Plot 1.—Area 0·21 acre. Wheat sown alone.
„ 2. „ 0·21 „ Wheat mixed with gram.
Commenced in 1890-91. Unmanured and unirrigated. Crop, wheat (Nagpur haura) and gram.

| No. of plot. | Kind of crop. | Outturn per acre. | | | | | | | | | | | | | Average for five years. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1890-91 | | 1891-92. | | 1892-93. | | 1893-94. | | 1894-95. | | | Cost of cultivation per acre. | Gain in value on plot 2. | Outturn per acre. | | | | |
| | | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Value. | | | Kind. | Grain. | Straw. | Value. | Gain in value on plot 1. |
| | | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. | | lbs. | lbs. | Rs. a. p. | Rs. a. p. |
| I | Wheat. | 704 | 973 | 277 | 418 | 558 | 761 | 278 | 500 | 283 | 426 | 10 0 9 | 5 15 8 | ... | Wheat. | 420 | 616 | 15 0 7 | ... |
| II | Wheat and Gram. | 473 | 571 | 169 | 317 | 333 | 395 | 214 | 483 | 261 | 424 | 14 8 10 | 6 9 11 | 4 8 1 | Wheat and Gram. | 290 | 458 | 16 2 11 | 1 2 4 |
| | | 332 | 501 | 131 | 240 | 143 | 310 | 43 | 86 | 157 | 238 | | | | | 161 | 275 | | |

Wheat was sown on the 13th of October in both the plots. The crop was not affected with rust, but was very thin. The outturn of wheat in plot No. 2 is 261 lbs., whereas in the proportion to seed sown, it should have been 212 lbs. The increase in produce appears due to the presence of a leguminous crop.

## VII.—EXPERIMENTS WITH TILLAGE.

9. Tillage. This experiment was started in 1890-91 in order to test the practice of the cultivators who merely scarify the ground for sowing wheat.

The field is divided into three plots. The first plot is ploughed every year; the second is scarified (bakhared) every year, and the third is ploughed every third year being hoed during the other two. The results are embodied in the subjoined table:—

FIELD NO. 21.—SUBJECT.—*Effect of tillage to various depths.*

Plot 1.—Area 0·23 acre. Ploughed every year.
„ 2. „ 0·23 „ Bakhared (scarified) every year.
„ 3. „ 0·23 „ Scarified every year and ploughed every third year.
Commenced in 1890-91. Unirrigated and unmanured. Plot No. 3 was not ploughed during the year under report.
Crop, wheat (hard-red) katha, in year under report.

| No. of plot. | OUTTURN PER ACRE. | | | | | | | | | | | Cost of cultivation per acre. | Gain in value on plot 2. | AVERAGE FOR FIVE YEARS. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1890-91. | | 1891-92. | | 1892-93. | | 1893-94. | | 1894-95. | | | | | OUTTURN PER ACRE. | | | Gain in value on plot 2. |
| | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Grain. | Straw. | Value. | | | Grain. | Straw. | Value. | |
| | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | Rs. a. p. | Rs. a. p. | Rs. a. p. | lb. | lbs. | Rs. a. p. | Rs. a. p. |
| I | 616 | 1,327 | 81 | 181 | 434 | 828 | 412 | 681 | 448 | 787 | 15 3 1 | 11 13 6 | 2 5 5 | 398 | 761 | 14 8 4 | —4 0 6 |
| II | 731 | 1,446 | 206 | 469 | 694 | 1,356 | 516 | 1,131 | 367 | 754 | 12 13 8 | 10 2 4 | ..... | 503 | 1,031 | 18 8 10 | ..... |
| III | 740 | 1,090 | 284 | 591 | 765 | 1,784 | 622 | 1,125 | 497 | 774 | 16 8 2 | 11 13 2 | 3 10 6 | 582 | 1,073 | 21 3 7 | +2 10 9 |

Wheat was sown on the 16th of October, but as the seedlings were greatly damaged by the heavy rains, it was resown on the 23rd November. The area of these plots which was 0·08 acre last year has been increased to 0·23 acre, being protected by a trench which is designed to check the effect of the roots of the mango trees, which are situated on the borders of the field. From the figures of outturns of the past five years it will be seen that plot No. 1, which is ploughed every year, shows the poorest results. The best crop is obtained in plot No. 3 which is ploughed every third year, which indicates that occasional deep ploughing is advantageous.

## VIII.—VARIETY OF CROPS.

Variety of crops.

10. Six different varieties of cotton were sown with the object of comparing their respective yields. Jari and bani are local varieties. Nimari was obtained from the Khandwa Tahsil in the Nimar District. Upland Georgian and tree cotton were raised from acclimatized seed and are American varieties. A small quantity of Egyptian cotton seed was sent for experimental cultivation by Dr. George Watt. Three varieties of wheat were tried, the object being to contrast the yield of the local haura and pissi with that of Mozaffarnagar.

The results of each of the experiments are tabulated below:—

FIELDS NOS. 38, 39 & 59.—SUBJECT.—*To compare the yield of different varieties of cotton—jari, bani nimari, upland Georgian and tree.*

Treatment.—All plots in fields Nos. 38, 39 and 59 manured with 160 maunds of dung.

| Number of plot. | Number of field. | Area. | Crop. | OUTTURN PER ACRE DURING 1894-95. | | | Gain in value on plot sown with jari. | OUTTURN PER ACRE DURING 1893-94. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lint. | Seed. | Value. | | Sub plot. | Number of field. | Crop. | Lint. | Seed. | Value. |
| | | Acres. | | lbs. | lbs. | Rs. a. p. | Rs. a. p. | | | | lbs. | lbs. | Rs. a. p. |
| I-N. | 38 | 0·06 | Cotton, Bani ... | 18 | 52 | 4 15 9 | 1 11 8 | I-E. | 37 | Cotton, Bani ... | 49 | 145 | 13 7 4 |
| I-S. | | 0·06 | „ Jari ... | 16 | 48 | 3 4 1 | ..... | I-W. | | „ Jari ... | 55 | 106 | 11 10 0 |
| II-N. | | 0·06 | „ Nimari ... | 16 | 44 | 4 7 10 | 1 3 9 | II-W. | | „ Nimari ... | 53 | 152 | 15 1 6 |
| II-S. | | 0·06 | „ Upland Georgian | 17 | 36 | 4 8 1 | 1 4 0 | II-E. | | „ Upland Georgian. | 59 | 144 | 15 11 3 |
| I-E. | 39 | 0·14 | Cotton, Jari ... | 30 | 68 | 5 12 1 | ..... | III-W. | | „ Tree ... | 51 | 126 | 12 5 3 |
| I-W. | | 0·14 | „ Bani ... | 29 | 89 | 8 1 10 | 2 5 9 | II | 55 | Cotton, Bani ... | 41 | 123 | 11 4 7 |
| II-E. | | 0·14 | „ Upland Georgian | 21 | 51 | 5 10 5 | —0 2 4 | I | | „ Jari ... | 54 | 111 | 11 8 5 |
| II-W. | | 0·14 | „ Nimari ... | 28 | 87 | 8 0 3 | 2 4 2 | III | | „ Nimari ... | 39 | 119 | 11 3 7 |
| I | 59 | 0·31 | Cotton, Bani ... | 27 | 85 | 7 9 5 | —1 7 9 | IV | | „ Upland Georgian. | 51 | 122 | 13 8 6 |
| II | | 0·31 | „ Jari ... | 47 | 110 | 9 1 2 | ..... | V | | „ Tree ... | 53 | 132 | 12 14 8 |
| III | | 0·31 | „ Upland Georgian | 25 | 65 | 6 13 0 | —2 1 2 | | | | | | |
| IV | | 0·31 | „ Nimari ... | 33 | 99 | 9 6 3 | —0 5 1 | | | | | | |
| V | | 0·31 | „ Tree ... | 29 | 73 | 7 11 2 | —1 6 0 | | | | | | |

The experiment was tried in three fields to ascertain the yield of the varieties of jari, bani, nimari, upland Georgian and tree cotton. The results obtained from a similar experiment in different land (fields No. 37 and 55) in the previous year are entered alongside for purposes of comparison. Samples of the outturn of each variety were sent to the Manager of the Empress Mills, Nagpur, for opinion. The Manager's reply is given below :—

* * * * *

"*Nimari.*—Fine, silky, strong, fairly long staple. Better than the present crop of the Hinganghat cotton. Price Rs. 82.

"*Bani.*—Fine, silky, strong, but somewhat irregular staple. Perhaps as good as present Hinganghat. Price Rs. 80.

"*Tree.*—As good as bani, but weak in staple. Fibre seems broken. Price Rs. 78.

"*Upland Georgian.*—Good, long, strong staple, rather rough and irregular in length. Price Rs. 80.

"*Jari.*—Coarse, woolly, very short and weak, not so good even as ordinary jari to be had in the district. Price Rs. 54."

The outturns were very poor in all the fields. Nimari cotton has shown as good results as those obtained last year, and stand first in point of quality, being priced by the Manager at Rs. 82 per *bhoja* of 345 lbs.

*Egyptian Cotton.*—A small packet of Egyptian cotton seed was received from the British Agent and Consul-General at Cairo through the Reporter on Economic Products to the Government of India.

The plants did not thrive and the bolls failed to burst. A few botanical specimens were taken away by Dr. Watt, on the occasion of his visit to the Farm, on the 27th November 1894.

FIELDS NOS. 34,44-N AND 67-N.—SUBJECT.—*Trial of Mozaffarnagar wheat against good local pissi or haura.*

Field No. 34— Plot 1—Area 0·16 acre; Plot 2 „ 0·16 „; Plot 3 „ 0·15 „

Field No. 44 N— Plot 1-N.—Area 0·19 acre; Plot 1-S. „ 0·19 „

Field No. 67 N— Plot 1-E—Area 0·13 acre; Plot 1-W „ 0·13 „

| No. of plot. | No. of field. | Area. | Outturn per Acre. Crop. | Manure and rate per acre. | Grain. | Straw. | Value. | Remarks. |
|---|---|---|---|---|---|---|---|---|
| | | Acres. | | | lbs. | lbs. | Rs. a. p. | |
| I | 34 | 0·16 | Wheat, Mozaffarnagar ... | Dung 160 maunds per acre ... | 469 | 881 | 20 13 0 | |
| II | | 0·16 | Do. Pissi ... | Do. ... | 605 | 806 | 20 5 7 | |
| III | | 0·15 | Do. Haura ... | Do. ... | 277 | 633 | 10 10 0 | |
| N. P. | 44 N. | 0·19 | Wheat, Haura ... | Dung 160 maunds per acre ... | 568 | 1,227 | 21 8 6 | |
| S. P. | | 0·19 | Do. Mozaffarnagar ... | Do. ... | 271 | 1,341 | 15 1 2 | |
| E. P. | 67 N. | 0·13 | Wheat, Pissi ... | Dung 160 maunds per acre ... | 592 | 877 | 20 3 8 | |
| W. P. | | 0·13 | Do. Mozaffarnagar ... | Do. ... | 727 | 1,596 | 33 1 8 | |

The results attained are somewhat contradictory. They are vitiated owing to the flooding of the fields at places.

## IX.—EXPERIMENTS WITH PLANT DISEASES.

Plant disease.

11. The principal plant disease which cultivators have to battle against in the Central Provinces is wheat rust (*Puccinia Rubigo Vera*) known in the vernacular as 'gerwa.' This disease generally makes its appearance when there is a large amount of humidity in the atmosphere, or when the seedbed is too moist.

If rust attacks wheat when in flower, the effects are very disastrous, but if, on the other hand, the crop is attacked by rust later on, *i. e.*, when the grain is formed, the loss sustained is not so great.

The first experiment which was conducted in field No. 33 was to see whether rusted seed of the three varieties of wheat (haura, pissi and katha) produces rust on the crop raised therefrom.

The second experiment was with mundia pissi. This variety is considered rust proof, and was sown along with pissi and haura, which are not so.

The third experiment was to test the effect of sowing wheat mixed with mustard as a preventive or a palliative of rust.

The fourth experiment consisted in trying kerosine oil as a white-ant exterminator in sugarcane fields.

The fifth experiment, which is in its infancy, was tried with the object of producing a new variety of wheat seed which may turn out rust proof.

As already observed, mundia pissi enjoys this reputation, but it is not a very marketable commodity, and the aim before us is to produce a seed which will command a good sale and also enjoy immunity from attacks of rust.

The experiment consisted of the artificial cross fertilization of one variety of wheat with three others, and the idea was obtained by me from an article which appeared in the *Agricultural Gazette* of New South Wales of July 1893.

FIELD No. 33.—SUBJECT.—*Effect of sowing rusted wheat and good wheat on the outturn.*

Plot I-E.—Area 0·19 Acre. Crop, wheat (good pissi)
„ I-W. „ 0·20 „ „ (rusted pissi)
„ II-E. „ 0·19 „ „ (good haura)
„ II-W. „ 0·20 „ „ (rusted haura)
„ III-E. „ 0·19 „ „ (good katha)
„ III-W. „ 0·20 „ „ (rusted katha)

| No. of plot. | Crop. | Outturn per acre. | | Remarks. |
|---|---|---|---|---|
| | | Grain. | Straw. | |
| | | lbs. | lbs. | |
| I-E. | Wheat (good pissi) ... | 508 | 845 | |
| I-W. | Do. (rusted pissi) ... | 411 | 615 | |
| II-E. | Do. (good haura) ... | 468 | 637 | |
| II-W. | Do. (rusted haura) ... | 432 | 550 | |
| III-E. | Do. (good katha) ... | 484 | 510 | |
| III-W. | Do. (rusted katha) ... | 445 | 515 | |

In each of the plots of this field good and rusted seed of the three different varieties of wheat, *viz*, pissi, haura, and katha were sown. Rust did not appear on any of the crops in the Farm this year, and none of the plots sown with rusted seed suffered from the disease. The outturns from the rusted seed are in all cases poor, but this is due to the percentage of germination in rusted seed being small. I observed that the fields sown with good seed had tillered freely, while those sown with rusted seed were very thin, and this accounts for the difference between the outturns of each. As for the quality of the grains the same number of each variety went to make up a dram, showing that there was no difference between the quality of the grains produced from rusted and good seed.

FIELD No. 40.—SUBJECT.—*To compare the effect of rust on four kinds of wheat—pissi, haura, mundia pissi and katha.*

Plot I-N.—Area 0·06 Crop, wheat (pissi)
„ I-S. „ 0·06 „ (haura)
„ II-N. „ 0·06 „ (mundia pissi)
„ II-S. „ 0·06 „ (katha)
Unmanured and unirrigated.

| No. of plot. | Crop. | Outturn per acre. | | Remarks. |
|---|---|---|---|---|
| | | Grain. | Straw. | |
| | | lbs. | lbs. | |
| I-N. | Wheat (pissi) ... | 567 | 1,017 | |
| I-S. | Do. (haura) ... | 369 | 648 | |
| II-N. | Do. (mundia pissi) ... | 842 | 1,192 | |
| II-S. | Do. (katha) ... | 554 | 812 | |

Field No. 40 suffered very badly from rust in 1893-94, and this field was accordingly selected this year in order to ascertain whether the spores of rust which had fallen in the preceding year would in any way affect this year's crop. Mundia pissi is a variety grown in the Harda Tahsil of the Hoshangabad District. This variety is said to be rust proof, and was procured from Mauzah Lanawad in the abovenamed tahsil. Wheat was sown in all the plots on November 17th. None of the plots suffered from rust. Plot 1-S was, however, water-logged and the wheat germinated very thinly. This accounts for the poor outturn of haura. Mundia pissi is a hardy variety no doubt, but fetches a smaller price, *i. e.*, 4 annas per maund less than pissi and haura. The experiment will be tried again.

FIELD NO. 55.—SUBJECT.—*Effect of a mustard crop on wheat rust.*

Plot 1.—Area 0·27 Acre Crop, wheat (haura with mustard.)
„ 2 „ 0·27 „ „ (haura alone.)
„ 3 „ 0·27 „ „ (haura with mustard.)
„ 4 „ 0·27 „ „ (haura alone.)
„ 5 „ 0·27 „ „ (haura with mustard.)

| No. of plot. | Crop. | Outturn per acre. | | | | Remarks. |
|---|---|---|---|---|---|---|
| | | Grain. | Straw. | Value. | Cost of cultivation. | |
| | | lbs. | lbs. | Rs. a. p. | Rs. a. p. | |
| I | Wheat ... | 315 | 611 | 12 13 2 | 9 2 7 | |
| | Mustard ... | 18 | 67 | | | |
| II | Wheat ... | 700 | 981 | 24 9 6 | 10 6 8 | |
| III | Wheat ... | 547 | 820 | 20 9 7 | 9 2 7 | |
| | Mustard ... | 21 | 67 | | | |
| IV | Wheat ... | 736 | 1,008 | 25 12 4 | 10 15 0 | |
| V | Wheat ... | 572 | 869 | 21 13 1 | 9 13 1 | |
| | Mustard ... | 23 | 90 | | | |

The fields were sown with wheat on the 17th October last. The crop was not affected with rust, but this does not imply that the absence of rust was due to the crop being mixed with mustard. As already stated there was no rust in the Farm last season.

12. An experiment with cross fertilization of wheat of four different kinds was made for the first time.

A few seeds of the different varieties of wheat were sown in pots in the following order :—

(A) 4 pots with haura. | (C) 4 pots with mundia pissi.
(B) 4 „ katha. | (D) 4 „ Seoni pissi.

The pollen of haura was brushed on one or two flowers of the plants in each one of the four pots B, C and D.

The pollen of katha was brushed on one or two flowers of the plants in one of each of the four pots A, C and D.

The pollen of mundia pissi was brushed on one or two flowers of the plants in one of each of the four pots A, B and D.

The pollen of Seoni pissi was brushed on one or two flowers of the plant in one of each of the four pots of A, B and C.

In each pot about two or three flowers were fertilized. I have thus been able to secure fertilized grains of five different sorts as shown below :—

| Father. | Mother. | Result. |
|---|---|---|
| Katha | Pissi | 2 grains. |
| Haura | Mundia | 1 grain. |
| Mundia | Katha | 1 grain. |
| Katha | Mundia | 1 grain. |
| Haura | Pissi | 1 grain. |

These grains will be sown this year and the results will appear in the report for 1895-96.

13. In field No. 67 the application of kerosine oil as a preventative against white-ants was tested.

On the 31st January 1894 a certain number of sets of canes were steeped for 12 minutes in a solution of kerosine oil and water in the proportion of 1 to 400 and then planted out.

The other plot was sown with the sets which were not steeped with the above solution.

Notwithstanding the fact that the seedlings suffered from a scarcity of water in the hot weather months, the water in both the wells in the compound of the Agricultural School and in the nala having dried up, the plants in both the plots were in equally good condition. White-ants did not appear in either of the plots.

I noticed that a weed called Nagarmotha (*Cyperus pertennis*) grew abundantly on a patch in each of these plots, and with a view to eradicate it, I adopted the process of mulching, which consists in covering the weeds with a thick layer of dry grass. This experiment not only checked the growth of the weed, but caused the plants which stood on the patch of land so mulched to grow better than the canes of the unmulched portion. The benefit derived by the plants may be due to the check of surface evaporation, which was derived from the mulching system. It was observed later on in the season that a number of plants in both the plots had been damaged by rats. Some poison pills were placed near their burrows, but this did not help to exterminate them and the crop had in consequence to be cut much earlier than usual.

The outturns of both the plots are given below :—

| Treatment. | Area. | Outturn per acre. | | |
|---|---|---|---|---|
| | | Canes. | Juice. | Gur, including syrup. |
| | Acres. | lbs. | lbs. | lbs. |
| 1. Ordinary ... | 0·09 | 68,133 | 42,011 | 4,411 |
| 2. Kerosine oil ... | 0·09 | 64,678 | 37,722 | 4,033 |

## X.—METHODS OF CULTIVATION.

Methods of cultivation.

14. The experiment noticed in last year's report for preventing the damage caused to rabi crops by trees in their vicinity was repeated this year with similar success.

## XI.—TRIAL OF IMPLEMENTS.

Implements.

15. The only new implement which was tried this year on the Farm is the Beehea thresher, which was obtained from Messrs. Thompson and Mylne in April 1895. The machine was received very late in the season when the threshings of wheat were nearly completed. I was therefore unable to give it a fair trial. The machine will be tried next season.

Walter A. Wood's mower and rake were transferred from Pachmarhi to the Farm. Both the machines work wonderfully well in cutting and collecting grass. There is a great saving of labour by using the mower. It cuts as much grass in one hour as would be cut by 20 women in the same time.

The implements which have been in trial for a number of years on the Farm and which have given satisfaction are (1) the Swedish plough, (2) Ransom's bullock-power thresher, (3) Mayfurth's hand-power thresher and (4) Dell's winnower.

## XII.—CATTLE-BREEDING.

Cattle-breeding.

16. The two Mysore bulls obtained in 1892, and referred to in paragraph 12 of last year's report, are gaining popularity and have covered 31 cows during the year under report. A report of the results of these coverings is awaited from the cattle owners.

The bulls now are perfectly tame and can be approached by the Farm servants without any risk. They are occasionally used in ploughing and in carting manure, &c.

## XIII.—EXPERIMENTS WITH FODDER AND FOREST RESERVES.

Fodder and Forest.

17. Seeds of the undermentioned forest trees were sown in the Telinkheri Reserve in June 1894 :—

1. Teak.
2. Babul.
3. Khair.
4. Anjun.
5. Bijasal.
6. Kurm.

All the seeds, except teak, germinated well. The plants stood the hot season very well indeed, and have now attained a height of about 6 inches.

The reserves are watched by two chowkidars, but with all their watchfulness, stray cattle enter the reserves and destroy numerous saplings. Last year the owners of cattle that had trespassed into the reserves were fined by the District Magistrate; but as the smallness of the fines had no deterrent effect, the District Magistrate recently imposed a heavier fine on

the owners of the cattle who had allowed their cattle to stray into the reserves, and it is hoped that they will not offend in this respect again. With a view to protect the reserve from stray cattle an area of about 10 acres has been fenced in with prickly pear.

A large quantity of seed of ber (*jujuba*), babul, teak and anjan, which were collected by me from trees growing on the Farm and in the vicinity, were sown last June. All the seeds germinated well. During the rainy season of 1894, a number of seedlings of teak growing on the Farm site were dug out and planted on the reserve. Three-fourths of the seedlings are alive. Before the approach of the hot season the plot on which the teak seedlings were planted out was covered over with a thick layer of dry grass, and this helped the seedlings to stand the hot weather.

The reserves supply the Farm and gardens with grass for the use of the cattle of both institutions. The value of the grass so supplied is about Rs. 500. The surplus grass is sold by public auction and the sale proceeds amount to something like Rs. 200.

This year an experiment in the ensilage of Telinkheri grass was undertaken. A pit 12′ × 15′ × 6′ was dug on the top of the hill and was filled with green grass weighing 13,467 lbs. The pit was closed on the 9th October 1894. On opening the pit on the 6th May 1895, it was discovered that about 6 inches of the top layer were damaged. The grass on the sides and at the bottom was in a good state of preservation and was eagerly eaten by cattle. Three samples of grass from the Telinkheri Reserve were sent to Dr. Leather for analysis in order to ascertain their nutrient value. Sample No. 1 consisted of grass taken from the silo pit. Sample No. 2 consisted of grass which was cut (when green) and dried. Sample No. 3 consisted of grass which was cut after it had dried on the land. Dr. Leather's report is reproduced below :—

"Considering in the first place the composition of the hay, the proportion of albuminoids is very low indeed, and in this respect they form the poorest samples which I have examined in India. The hay made from grass cut green contains only one-third as much albuminoids as good English hay will contain, and the other sample not more than one-fifth. The percentages of this constituent are moreover less than in the hay made at the Usar Reserve at Cawnpore. The proportions of carbohydrates (other than woody fibre) are about normal; but the amount of woody fibre is higher than in English hay, though about the same as in the hay made on the Cawnpore "Usar". At the same time, and although these samples of hay from the Telinkheri Reserve are open to the above criticism, a comparison between the analysis of the two will show that the proportion of albuminoids and soluble carbohydrates is higher in the hay which was made from green grass than in that from the grass cut dry, whilst the proportion of woody (indigestible) fibre is lower.

"I have referred to the importance of cutting grass in the green state in paragraph 22 of my Annual Report of 1893-94, and this case exemplifies the advantage of doing so. Although the grass at Telinkheri is poor, probably (owing to the nature of the land which is exceptionally poor), an advantage would be gained by cutting it in the green state.

"Referring in the second place to the quality of the silage, it will be seen that the proportion of albuminoids is as high as in the sample of hay made from green grass. There has been some loss of albuminoids during the process of ensilage, but this loss is less than I should have expected. The sample reached me quite dry, and I am not altogether in a position to speak further as to its quality than to say that it was not mouldy."

The following analysis accompanied the report of the Agricultural Chemist :—

| | Laboratory numbers— | | |
|---|---|---|---|
| | 208. | 209. | 210. |
| | Silage. | Telinkheri grass cut dry. | Telinkheri grass cut green. |
| Moisture ... ... ... | 12·08 | 9·81 | 9·23 |
| Albuminoids * ... ... ... | 2·53 | 1·54 | 2·46 |
| Soluble carbohydrates ... ... ... | 6·22 | 8·09 | 12·84 |
| Insoluble do. ... ... ... | 34·30 | 31·30 | 31·32 |
| Woody fibre ... ... ... | 33·95 | 34·58 | 31·75 |
| Ash † ... ... ... | 10·92 | 14·68 | 12·40 |
| | 100·00 | 100·00 | 100·00 |
| Total Nitrogen ... | 0·471 | 0·261 | 0·411 |
| Containing albuminoid nitrogen * ... ... | 0·405 | 0·207 | 0·394 |
| „ insoluble siliceous matter † ... ... | 9·34 | 12·01 | 10·66 |

## XIV.—SEWAGE FARM.

Sewage Farm.

18. The condition of the Sewage Farm is the same as that described in my report of last year.

## XV.—AGRICULTURAL CLASS.

Agricultural Class.

19. The working of the Agricultural Class is separately reported upon. The year opened with 11 senior students. Six new students joined the Junior Class. Four were scholarship-holders. Five had passed the Middle School and one the Entrance Examination. Practical field-work was, as usual, insisted upon. The senior students sowed both kharif and rabi crops on the half acre plots allotted to them, and the juniors sowed only rabi crops on their quarter acre plots. The total area under cultivation was 7·5 acres, and the students realized Rs. 87-13-0 by the sale of their crops, each one appropriating the produce of his own plot.

The annual examination papers were set by the undermentioned gentlemen:—

Dr. J. W. Leather, Agricultural Chemist to the Government of India. } Agriculture.

Dr. A. Robertson, M. B., Professor, Hislop College ... { Botany, Geology and Chemistry.

Veterinary-Captain F. T. Short, Superintendent, Civil Veterinary Department, Central Provinces and Berar. } Veterinary.

Mr. Parmanand, Assistant Settlement Officer, Nagpur ... Surveying.

I examined the students in practical agriculture, such as ploughing, harrowing, &c. The results were fairly satisfactory. Eight out of eleven seniors passed the Final Examination, and five out of six juniors were promoted to the second year's course. The three unsuccessful men of the senior class are undergoing a third year's tuition.

In the Normal Agricultural Class for Village Schoolmasters there were 31 pupils from districts in the first term and 31 in the second term.

## FINANCIAL RESULTS.

20. The expenditure and receipts of the year are shown below:—

| | Expenditure. | | | Receipts. | Net cost. |
|---|---|---|---|---|---|
| | Salaries. | Contingencies. | Total. | | |
| | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p |
| Budget ... ... | 4,524 0 0 | 7,076 0 0 | 11,600 0 0 | 2,050 0 0 | 9,550 0 ( |
| Actual ... ... | 3,835 8 5 | 6,999 12 0 | 10,835 4 5 | 1,996 14 0 | 8,838 6 5 |

I have the honour to be,

Sir,

Your most obedient Servant,

R. S. JOSHI,

*Superintendent,*

*Government Experimental Farm, Nagpur.*

## LIST OF ANNEXURES.

**A.**—Statement showing the total areas under cultivation on the Experimental Farm, Nagpur, during 1894-95.

**B.**—Statement showing the average rates of the cost of cultivation on the Experimental Farm, Nagpur, during 1894-95.

**C.**—Statement showing the rates used for valuing the produce of the Experimental Farm, Nagpur, during 1894-95.

**D.**—Programme of experiments as it stood on the 1st June 1895.

# Annexure A.

*Total area under cultivation on the Experimental Farm, Nagpur, during the year* 1894-95.

| Crop. | Area. | Total. | Grand Total. |
|---|---|---|---|
| A.—EXPERIMENTAL AREA. | Acres. | Acres. | Acres. |
| (1). *Kharif*— | | | |
| Cotton alone ... ... ... ... | 4·12 | | |
| Cotton and tur ... ... ... ... | ·60 | | |
| Cotton and juar ... ... ... ... | ·30 | | |
| Juar alone ... ... ... ... | ·81 | | |
| (2). *Rabi*— | | 5·83 | |
| Wheat ... ... ... ... | 11·03 | | |
| Wheat and gram ... ... ... ... | ·21 | | |
| Wheat and mustard ... ... ... | ·81 | | |
| Gram ... ... ... ... | 1·21 | | |
| Linseed ... ... ... ... | 3·04 | | |
| Oats ... ... ... ... | 1·35 | | |
| Sugarcane ... ... ... ... | ·18 | | |
| | | 17·83 | 23·66 |
| B.—NON-EXPERIMENTAL AREA. | | | |
| (1). *Kharif*— | | | |
| Cotton ... ... ... ... | 3·48 | | |
| Juar ... ... ... ... | 2·94 | | |
| Tur ... ... ... ... | 11·61 | | |
| Popat ... ... ... ... | ·25 | | |
| Mote ... ... ... ... | ·19 | | |
| Til ... ... ... ... | ·73 | | |
| | | 19·20 | |
| (2). *Rabi*— | | | |
| Wheat ... ... ... ... | 11·43 | | |
| Linseed ... ... ... ... | 3·63 | | |
| Gram ... ... ... ... | 6·08 | | |
| Masur ... ... ... ... | ·36 | | |
| Peas ... ... ... ... | ·72 | | |
| Wheat and gram ... ... ... ... | ·45 | | |
| Gram and khardi ... ... ... | 2·26 | 24·93 | 44·13 |
| | ... | ... | 67·79 |

# Annexure B.

*Statement showing the average cost per acre of each operation of cultivation on the Experimental Farm, Nagpur, during the year* 1894-95, *as deduced from the Field Cultivation Book.*

[NOTE.—The hire of a pair of bullocks is taken as 12 annas; of a male cooly 3 annas; of a female cooly 1½ annas; and of a child 1 anna.]

| Class of operation. | Detail. | Rate per acre. | Explanation. |
|---|---|---|---|
| | | Rs. A. P. | |
| Cost of tillage. | Ploughing by Swedish plough ... | 2 7 6 | A pair of bullocks and a man for 2·63 days. |
| | Hoeing by bakhar (bullock hoe) ... | 0 9 6 | Do. do. ·63 day. |
| | Weed hoeing by daura (small bullock weeding hoe) ... ... | 0 8 1 | Do. and 2 men for ·44 day. |
| | Do. by dundia (large do.) ... | 0 6 2 | Do. do. ·34 day. |
| | Weeding by hand ... ... | 0 12 8 | 10 women for ·84 day. |
| Cost of sowing, including cost of seed. | Cotton by argarha (country drill hoe) ... | 0 10 0 | 16 lbs. of seed (Re. 0-4-2). A pair of bullocks and a man and 3 women for ·29 day. |
| | Tur by do. do. ... | 0 11 6 | 17 lbs. of seed (Re. 0-5-3). A pair of bullocks and a man and 3 women for ·29 day. |
| | Juar by tifan (country drill) ... | 0 11 8 | 14 lbs. of seed (Re. 0-5-2). A pair of bullocks and 2 men for ·36 day. |
| | Gram by nari nagar (drill plough) ... | 1 14 9 | 40 lbs. of seed (Re. 1-0-9). A pair of bullocks and 2 men for ·77 day. |
| | Linseed by tifan (country drill) ... | 1 10 9 | 18 lbs. of seed (Re. 1-1-5). Two pairs of bullocks and 3 men for ·28 day. |
| | Wheat by nari nagar (drill plough) ... | 3 15 11 | 90 lbs. of seed (Rs. 2-9-5). Two pairs of bullocks and 3 men for ·68 day. |
| Cost of manure (excluding loading, carting and spreading). | Saltpetre ... ... | 20 3 4 | 240 lbs. @ Rs. 6-11-9 per maund. |
| | Bone-dust ... ... | 3 6 0 | 360 lbs.; cost of collecting Re. 0-8-0 per maund, and of crushing Re. 0-4-0 per maund. |
| | Cattle-dung ... ... | 10 0 0 | 160 maunds @ Re. 0-1-0 per maund. |
| | Ashes of dung ... ... | 11 0 8 | 160 maunds dung @ Re. 0-1-0 per maund, and drying and burning dung for ashes Re. 1-0-8 per acre. |
| | Green-manuring with san hemp ... | 7 8 10 | 120 lbs. of seed @ Rs. 2-11-4, sowing Re. 0-0-10, covering seed by harrow Re. 0-4-2, and cutting and ploughing Rs. 4-8-6. |
| | Do. with bawachi (*Psorolia corilifolia*)... | 7 6 2 | Cutting and carting bawachi Rs. 3-12-11 and ploughing Rs. 3-9-3. |
| Cost of harvesting. | Picking cotton ... ... | 0 3 3 | 2 women for 1·08 days—each picking |
| | Reaping juar ... ... | 0 7 2 | 8 do. ·59 day. |
| | Do. gram ... ... | 0 9 9 | 7 do. ·92 day. |
| | Do. linseed ... ... | 0 5 1 | 5 do. ·67 day. |
| | Do. wheat ... ... | 0 5 1 | 4 do. ·84 day. |
| Cost of threshing and cleaning. | Ginning cotton (by country hand-charkha) ... | 1 0 5 | 15 do. ·72 day; average produce per acre 103 lbs. of seed cotton. |
| | Threshing and cleaning juar ... | 0 2 6 | 1 man and 1 women for ·55 day; average produce per acre 88 lbs. of grain and 881 lbs. of karbi. |
| | Do. gram ... ... | 0 10 0 | 4 bullocks, 1 man, 2 women and 2 boys for ·31 day; average produce per acre 523 lbs. of grain and 837 lbs. of straw. |
| | Do. linseed ... ... | 0 1 10 | 2 women for ·61 day; average produce per acre 24 lbs. of grain and 55 lbs. of stalks. |
| | Do. wheat ... ... | 1 1 10 | 4 bullocks, 1 man, 3 women and 2 boys for ·53 day; average produce per acre 531 lbs. of grain and 841 lbs. of straw. |

# Annexure C.

*Statement showing the rates used for valuing the produce of the Experimental Farm, Nagpur, during the year* 1894-95.

| Name of Produce. | | Value. Rate. Rs a. p. | Value. Per | Remarks. |
|---|---|---|---|---|
| Cotton ... Lint ... (according to quality) ... | | 62 0 0 | Bojha of 345 lbs. | |
| | | 80 0 0 | | |
| | | 78 0 0 | | |
| | | 54 0 0 | | |
| Cotton seed ... ... ... ... | | 10 0 0 | Khandi of 640 lbs. | |
| Juar ... | Grain ... ... ... | 10 0 0 | Do. of 390 „ | |
| | Karbi ... ... ... | 25 0 0 | Sheaves 1,000 | About 3,460 lbs. |
| Tur ... | Grain ... ... ... | 10 8 0 | Khandi of 421 lbs. | |
| | Stalks ... ... ... | 0 12 0 | 8 bundles. | About 560 lbs. |
| | Bhusa ... ... ... | 1 8 0 | One cart-load. | About 478 lbs. |
| Gram ... | Grain ... ... ... | 11 0 0 | Khandi of 390 lbs. | |
| | Chaff ... ... ... | 1 8 0 | One cart-load. | About 478 lbs. |
| Linseed (chaval-katha) ... | Grain ... ... ... | 23 0 0 | Khandi of 385 lbs. | |
| | Stalks and bhusa ... ... | 1 8 0 | One cart-load. | About 478 lbs. |
| Wheat (haura) Nagpur ... | Grain ... ... ... | 12 0 0 | Khandi of 400 lbs. | |
| | Straw ... ... ... | 1 12 0 | One cart-load. | About 478 lbs. |
| Do. (katha) do. ... | Grain ... ... ... | 11 0 0 | Khandi of 400 lbs. | |
| | Straw ... ... ... | 1 12 0 | One cart-load. | About 478 lbs. |
| Do. (pisi) do. ... | Grain ... ... ... | 11 8 0 | Khandi of 400 lbs. | |
| | Straw ... ... ... | 1 12 0 | One cart-load. | About 478 lbs. |

# Annexure D.

## EXPERIMENTAL FARM, NAGPUR.

*Programme of Experiments as it stood on the 1st June 1895.*

| No. of field. | Purpose of experiment. | Crop. 1st year. | Crop. 2nd year. | Crop. 3rd year. | Special treatment. 1st year. | Special treatment. 2nd year. | Special treatment. 3rd year. | Year (commencing June) in which experiment started. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | **Manure Experiments.** | | | | | |
| 18—1 | Relative effect of green-manuring, box-dung and stall-dung. | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | *Psorolia corilifolia* to be sown and ploughed in green. | Same as in first year | Same as in first year. | 1890. | Cropping and treatment similar every year. |
| —2 | | Do. ... | Do. ... | Do. ... | *Nil.* | Do. ... | Do. ... | | |
| —3 | | Do. ... | Do. ... | Do. ... | Box-dung ... | Do. ... | Do. ... | | |
| —4 | | Do. ... | Do. ... | Do. ... | Stall-dung ... | Do. ... | Do. ... | | |
| 32—1 | Effect on wheat of green-manuring with papilionaceous weeds (*Psorolia corilifolia*). | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Green-manuring with weeds cut from waste land. | Same as in first year. | Same as in first year. | 1891. | Cropping and treatment similar every year. NOTE.—It is possible that this field may be irrigated. |
| —2 | | Do. ... | Do. ... | Do. ... | *Nil.* | Do. ... | Do. ... | | |
| 68—1 | Effect on wheat of manuring with saltpetre in different rates per acre. | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | *Nil.* | Same as in first year | Same as in first year. | 1894. | Cropping and treatment similar every year. To be irrigated. |
| —2 | | Do. ... | Do. ... | Do. ... | Saltpetre drilled in with seed, 240 lbs. per acre. | Do. ... | Do. .. | | |
| —3 | | Do. ... | Do. ... | Do. ... | Saltpetre drilled in with seed, 80 lbs. per acre. | Do. ... | Do. ... | | |
| A—1 | Effect on wheat grown continuously of different kinds of manures applied year after year without irrigation. | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Saltpetre. | Same as in first year. | Same as in first year. | 1883. | Cropping and treatment similar every year. Quantities per acre— Saltpetre 240 lbs. Bone-dust 360 lbs. Cattle-dung 160 mds. Ashes of 160 mds. dung. |
| —2 | | Do. ... | Do. .. | Do. ... | Bone-dust. | Do. ... | Do. .. | | |
| —3 | | Do. ... | Do. ... | Do. ... | Saltpetre and bone-dust. | Do. ... | Do. ... | | |
| —4 | | Do. ... | Do. ... | Do. ... | Cattle-dung. | Do. ... | Do. ... | | |
| —5 | | Do. ... | Do. ... | Do. ... | Dung and bone-dust. | Do. ... | Do. ... | | |
| —6 | | Do. ... | Do. ... | Do. ... | Ashes of dung. | Do. ... | Do. ... | | |
| —7 | | Do. ... | Do. ... | Do. ... | *Nil.* | Do. ... | Do. ... | | |
| —8 | | Do. ... | Do. ... | Do. ... | San hemp ploughed in green. | Do. ... | Do. ... | | |
| B—1 | Effect on wheat grown continuously of different kinds of manures applied year after year with irrigation. | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Saltpetre. | Same as in first year. | Same as in first year. | 1890. | Cropping and treatment similar every year. To be irrigated. Quantities per acre, as for Series A. |
| —2 | | Do. ... | Do. ... | Do. ... | Bone-dust. | Do. ... | Do. ... | | |
| —3 | | Do. ... | Do. ... | Do. ... | Saltpetre and bone-dust. | Do. .. | Do. ... | | |
| —4 | | Do. ... | Do. ... | Do. ... | Cattle-dung. | Do. ... | Do. ... | | |
| —5 | | Do. ... | Do. ... | Do. ... | Dung and bone-dust. | Do. ... | Do. ... | | |
| —6 | | Do. ... | Do. ... | Do. ... | Ashes of dung. | Do. ... | Do. ... | | |
| —7 | | Do. ... | Do. ... | Do. ... | *Nil.* | Do. ... | Do. ... | | |
| —8 | | Do. ... | Do. ... | Do. ... | San hemp ploughed in green. | Do. ... | Do. ... | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| C—1 | Effect on linseed grown continuously of different kinds of manures applied year after year. | Linseed (chaval-katha). | Linseed (chaval-katha). | Linseed (chaval-katha). | Saltpetre. | Same as in first year. | Same as in first year | 1895. | Cropping and treatment similar every year. |
| —2 | | Do. ... | Do. ... | Do. ... | Bone-dust. | Do. ... | Do. ... | | |
| —3 | | Do. ... | Do. ... | Do. ... | Tarota to be ploughed in green. | Do. ... | Do. ... | | |
| —4 | | Do. ... | Do. ... | Do. ... | Cattle dung. | Do. ... | Do. ... | | |
| —5 | | Do. ... | Do. ... | Do. ... | Bawachi to be ploughed in green. | Do. ... | Do. ... | | |
| —6 | | Do. ... | Do. ... | Do. ... | Ashes of dung. | Do. ... | Do. ... | | |
| —7 | | Do. ... | Do. ... | Do. ... | *Nil.* | Do. ... | Do. ... | | |
| —8 | | Do. ... | Do. ... | Do. ... | San hemp ploughed in green. | Do. ... | Do. ... | | |
| Ville—1 | Practical method of soil analysis by using chemical manures, as devised by M. Georges Ville. | Linseed (chaval-katha). | Linseed (chaval-katha). | Linseed (chaval-katha. | Amm. chlor. cal. Superphosp: pot. sulph. and cal. sulph. | Same as in first year. | Same as in first year. | 1895. | Cropping and treatment similar every year. Quantities per acre— Amm. chlor, 140 lbs. Cal. superphosp. 180 lbs. Potassic sulphate 90 lbs. Calcic sulphate 100 lbs. |
| —2 | | Do. ... | Do. .. | Do. ... | As in 1 less cal. superphosphate. | Do. ... | Do. ... | | |
| —3 | | Do. ... | Do. ... | Do. ... | As in 1 less amm. chlor. | Do. ... | Do. ... | | |
| —4 | | Do. ... | Do. ... | Do. ... | No manure. | Do. .. | Do. .. | | |
| —5 | | Do. ... | Do ... | Do. ... | As in 1 less potassic sulphate. | Do. ... | Do. ... | | |
| —6 | | Do. ... | Do. ... | Do. ... | As in 1 less calcic sulphate. | Do. ... | Do. ... | | |
| 34—1 | To test the effect of manuring at different times of the year. | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Manured with dung in August. | Manured with dung in August. | Manured with dung in August. | ... | Duration of the experiment is of one year only. |
| —2 | | Do. ... | Do. ... | Do. | Manured with dung in June. | Manured with dung in June. | Manured with dung in June. | | |
| —3 | | Do. ... | Do. ... | Do. ... | Manured with dung in August. | Manured with dung in August. | Manured with dung in August. | | |
| 37—1 | Do. ... | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Manured with dung in August. | Manured with dung in August. | Manured with dung in August. | ... | Duration of the experiment is of one year only. |
| —2 | | Do. ... | Do. ... | Do. ... | Manured with dung in June. | Manured with dung in June. | Manured with dung in June. | | |
| —3 | | Do. .. | Do. ... | Do. ... | Manured with dung in August. | Manured with dung in August, | Manured with dung in August. | | |
| 40—1 | To test the effect of nitrogenous and non-nitrogenous crops on wheat. | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Wheat haura, Nagpur). | San hemp ploughed in green. | San hemp ploughed in green. | San hemp ploughed in green. | ... | Duration of the experiment is of one year only. |
| —2 | | Do. ... | Do. ... | Do. ... | Ambadi ploughed in green. | Ambadi ploughed in green. | Ambadi ploughed in green. | | |
| 55—1 | Do. ... | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | San hemp ploughed in green. | San hemp ploughed in green. | San hemp ploughed in green. | ... | Duration of the experiment is of one year only. |
| —2 | | Do. ... | Do. ... | Do. ... | Ambadi ploughed in green. | Ambadi ploughed in green. | Ambadi ploughed in green. | | |

## Rotation Experiments.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 29—1 | Effect of rotations with wheat. | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | *Nil.* | *Nil.* | *Nil.* | 1890. | Two year rotation. i. e., the fourth year will follow the second. |
| —2 | | Do. ... | Fallow ... | Do. ... | Do. ... | Do. ... | Do. ... | | |
| —3 | | Do. ... | Gram. ... | Lo. ... | Do. .. | Do. ... | Do. ... | | |
| —4 | | Do. ... | Juar and tur ... | Do. ... | Do. ... | Do. ... | Do. ... | | |
| —5 | | Do. ... | Kodon ... | Do. ... | Do. ... | Do. ... | Do. ... | | |

# Annexure D.—(*Contd.*)

| No. of field. | Purpose of experiment. | Crop. 1st year. | Crop. 2nd year. | Crop. 3rd year. | Special treatment. 1st year. | Special treatment. 2nd year. | Special treatment. 3rd year. | Year (commencing June) in which experiment started. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | **Rotation Experiments.—(Concld.)** | | | | | |
| 57—1 | Effect of rotations with linseed. | Linseed (chaval-katha. | Linseed (chaval-katha). | Linseed. | *Nil.* | *Nil.* | *Nil.* | 1890. | Two year rotation, *i. e.*, the fourth year will follow the second. |
| —2 | | Do. .. | Gram | Do. .. | Do. .. | Do. .. | Do. ... | | |
| —3 | | Do. ... | Cotton (jari, Nagpur). | Do. ... | Do. ... | Do. ... | Do. ... | | |
| —4 | | Do. ... | Tur. | Do. ... | Do. ... | Do. ... | Do. ... | | |
| 61—1 | Effect of rotations with cotton. | Cotton (Jari) and Tur. | Cotton (jari) and Tur. | Cotton (jari,) and Tur. | *Nil.* | *Nil.* | *Nil.* | 1893. | Two year rotation, *i. e.*, the fourth year will follow the second. |
| —2 | | Do. ... | Wheat (haura, Nagpur). | Do. ... | Do. ... | Do. .. | Do. ... | | |
| —3 | | Do. ... | Gram. | Do. ... | Do. ... | Do. .. | Do. ... | | |
| | | | | **Experiments in Manure and Rotations.** | | | | | |
| 14—1 | Effect of green manuring with san hemp. —on wheat with fallow interposed. —on wheat in rotation with cotton. | Fallow ... | Wheat (haura, Nagpur). | Fallow ... | Green-manuring with san hemp. | *Nil.* | Green manuring with san hemp. | 1891. | Cropping and treatment similar every year. |
| —2 | | Do. .. | Do. ... | Do. ... | *Nli.* | Do. .. | *Nil.* | | |
| —3 | | Wheat (haura, Nagpur). | Cotton (jari, Nagpur). | Wheat (haura, Nagpur) | Green manuring with san hemp. | Do. | Green manuring with san hemp. | | |
| —4 | | Do. ... | Do. ... | Do. ... | *Nil.* | Do. .. | *Nil.* | | |
| 17—1 | Effect on wheat and cotton in rotation of green-manuring papilionaceous weeds (*Psorolia corilifolia.*) | Wheat (haura. Nagpur). | Cotton (jari, Nagpur). | Wheat (haura. Nagpur). | Green manuring with weeds cut from waste land. | *Nil.* | Green manuring with weeds cut from waste land. | 1890. | Cropping and treatment similar every year. |
| —2 | | Do. ... | Do. ... | Do. ... | *Nil.* | Do. ... | *Nil.* | | |
| 42—1 | Relative effect of dung and bone-dust applied each year on juar and linseed grown in rotation. | Juar ... | Linseed (chaval-katha). | Juar. ... | Dung. ... | Dung ... | Dung ... | 1890. | Manures continued every year. Crops to be in rotation. |
| —2 | | Do. ... | Do. ... | Do. ... | *Nil.* ... | *Nil.* ... | *Nil.* .. | | |
| —3 | | Do. ... | Do. ... | Do. ... | Bone-dust. ... | Bone-dust ... | Bone-dust ... | | |
| 44—1 | Relative effect on cotton and wheat in rotation of box-dung, stall-dung and bone-dust. | Cotton (jari, Nagpur). | Wheat (haura, Nagpur. | Cotton (jari, Nagpur. | Stall-dung .. | Same as in first year. | Same as in first year. | 1890. | Manures continued every year. Crops to be in rotation. |
| —2 | | Do. ... | Do. ... | Do. ... | Box-dung ... | Do. ... | Do. ... | | |
| —3 | | Do. ... | Do. ... | Do. ... | *Nil.* ... | Do. ... | Do. ... | | |
| —4 | | Do. ... | Do. ... | Do. ... | Bone-dust ... | Do. ... | Do. ... | | |
| 63—1 | Relative effect on linseed and cotton in rotation of box-dung and stall-dung applied in alternate years only. | Linseed (chaval-katha). | Cotton (jari, Nagpur). | Linseed (chaval-katha.) | *Nil.* ... | Box-dung .. | Nil. ... | 1890. | To be manured with the same kinds of manure every alternate year and crop to be in rotation. |
| —2 | | Do. ... | Do. ... | Do. .. | Do. ... | *Nil.* ... | Do. ... | | |
| —3 | | Do. ... | Do. ... | Do. ... | Do. ... | Do. ... | Do. ... | | |
| | | | | | | Do. .. | Do. ... | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 65—1 | Effect of liming soils. | Wheat (haura, Nagpur). | Cotton, (jari, Nagpur). | Wheat (haura, Nagpur). | Caustic lime. ... | *Nil.* ... | *Nil.* ... | 1890. | No. 1 was limed in 1890-91, and another application of lime to be made after 12 years. The crops to be in rotation and manures, especially organic ones to be applied to both the plots equally occasionally. |
| —2 | | Do. ... | Do. ... | Do. ... | *Nil.* ... | *Nil.* ... | Do. .. | | |
| | **Experiments with Mixtures of Crops.** | | | | | | | | |
| 55—3 | Effect of mixing crops, the principal one being cotton. | Cotton (jari, Nagpur). | Same as in first year. | Same as in first year. | *Nil.* ... | *Nil.* ... | *Nil.* ... | 1895. | Cropping similar every year. Manure to be applied occasionally. |
| —4 | | Cotton (jari) and tur in the proportion of 6 lines to 2. | Do. .. | Do. ... | Do. ... | Do. ... | Do. ... | | |
| —5 | | Cotton (jari) and Juar in the proportion of 6 lines to 2. | Do. ... | Do. ... | Do. ... | Do. ... | Do. ... | | |
| 25—1 | Effect of mixing crops Wheat and a leguminous crop (gram.) | Wheat (haura, Nagpur). | Same as in first year. | Same as in first | *Nil.* ... | *Nil.* ... | *Nil.* ... | 1890. | Cropping similar every year. Manure to be applied occasionally. |
| —2 | | Wheat (haura, Nagpur) and gram. | Do. .. | Do. ... | Do. ... | Do. ... | Do. .. | | |
| | **Experiments with Tillage.** | | | | | | | | |
| 21—1 | Effect of tillage to various depths. | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | To be ploughed every year | | | 1890. | Cropping and treatment similar every year. |
| —2 | | Do. .. | Do. ... | Do. ... | To be hoed (bakhared) every year. | | | | |
| —3 | | Do. ... | Do. ... | Do. ... | To be ploughed every third year, being hoed during the other two. | | | | |
| | **Variety of Crops.** | | | | | | | | |
| 9—1 | To test the yield of varieties of cotton. | Cotton, Jari ... | Cotton, Jari ... | Cotton, Jari ... | *Nil.* ... | *Nil.* ... | *Nil.* ... | ... | Duration of the experiment is of one year only. |
| —2 | | Do. Bani ... | Do. Bani .. | Do. Bani .. | | | | | |
| —3 | | Do. Nimari .. | Do. Nimari .. | Do. Nimari .. | Do. ... | Do ... | Do. .. | | |
| —4 | | Cotton, Upland Georgian. | Cotton, Upland Georgian. | Cotton, Upland Georgian. | Do. ... | Do. .. | o. .. | | |
| —5 | | Cotton, tree ... | Cotton, tree ... | Cotton, tree .. | Do. ... | Do. ... | Do. ... | | |
| | | | | | Do. ... | Do. ... | Do. .. | | |
| 88—1 | To test the quantity of fibre-whether it is deteriorated by keeping the last year's plants. | Cotton, Bani and Jari. | Cotton, Bani and Jari. | Cotton, Bani and Jari. | Top-dressing with manure. | Top-dressing with manure. | Top-dressing with manure. | ... | Duration of the experiment is of one year only. |
| —2 | | Cotton, Upland Georgian and Nimari. | Cotton, Upland Georgian and Nimari. | Cotton, Upland Georgian and Nimari. | Do. ... | Do. .. | Do. ... | | |
| | **Experiments with Plant Diseases.** | | | | | | | | |
| 15—1 | To test the effect of wheat and mustard in a mixture. | Wheat (haura, Nagpur) and mustard sown in mixture. | Wheat (haura, Nagpur) and mustard sown in mixture. | Wheat (haura, Nagpur) and mustard sown in mixture. | *Nil.* ... | *Nil.* .. | *Nil.* ... | ... | Duration of the experiment is of one year only. |
| —2 | | Do. ... | Do. ... | Do. .. | Do. ... | Do. ... | Do. ... | | |



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# Annexure D.—(*Concld.*)

| No. of field. | Purpose of experiment. | Crop. 1st year. | Crop. 2nd year. | Crop. 3rd year. | Special treatment. 1st year. | Special treatment. 2nd year. | Special treatment. 3rd year. | Year (commencing June) in which experiment started. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | **Experiments with Plant Diseases.—(Concld.)** | | | | | |
| 82—1 | To test the effect of yield of different varieties of wheat. | Wheat (mundia pissi) supposed to be rust proof. | Wheat (mundia pissi) supposed to be rust proof. | Wheat (mundia pissi) supposed to be rust proof. | *Nil.* ... | *Nil.* ... | *Nil.* ... | ... | Duration of the experiment is of one year only. |
| —2 | | Wheat (Nagpur haura). | Wheat (Nagpur haura). | Wheat (Nagpur haura). | Do. ... | Do. ... | Do. ... | | |
| —3 | | Wheat (Mozaffarnagar). | Wheat (Mozaffarnagar). | Wheat (Mozaffarnagar). | Do. ... | Do. ... | Do. ... | | |
| 82—1 | To test the effect of yield of different varieties of wheat. | Wheat (mundia pissi) supposed to be rust proof. | Wheat (mundia pissi) supposed to be rust proof. | Wheat (mundia pissi) supposed to be rust proof. | *Nil.* ... | *Nil.* ... | *Nil.* ... | ... | Duration of the experiment is of one year only. |
| —2 | | Wheat (Nagpur haura). | Wheat (Nagpur haura). | Wheat (Nagpur haura). | Do. ... | Do. ... | Do. ... | | |
| —3 | | Wheat (Mozaffarnagar). | Wheat (Mozaffarnagar). | Wheat (Mozaffarnagar). | Do. ... | Do. ... | Do. ... | | |
| 59—1 | To test the effect of gram on linseed dying from talap. | Linseed (haura, Nagpur). | Linseed (haura, Nagpur). | Linseed (haura, Nagpur). | *Nil.* ... | *Nil* ... | *Nil* ... | ... | Duration of the experiment is of one year only. |
| —2 | | Linseed (haura, Nagpur) and gram. | Linseed (haura, Nagpur) and gram. | Linseed (haura, Nagpur) and gram. | Do. .. | Do. ... | Do. | | |
| —3 | | Linseed (haura, Nagpur). | Linseed (haura, Nagpur). | Linseed (haura, Nagpur). | Do. ... | Do. ... | Do. ... | | |
| —4 | | Linseed (haura, Nagpur) and gram | Linseed (haura, Nagpur) and gram. | Linseed (haura, Nagpur) and gram. | Do. ... | Do. ... | Do. ... | | |
| —5 | | Linseed (haura, Nagpur). | Linseed (haura, Nagpur). | Linseed (haura, Nagpur). | Do. ... | Do. ... | Do. ... | | |
| | | | | **Methods of Cultivation.** | | | | | |
| 26—1 | To test the effect of rolling the field with a stone roller after the green manure is ploughed in. | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | Wheat (haura, Nagpur). | San hemp ploughed in and rolled. | San hemp ploughed in and rolled. | San hemp ploughed in and rolled. | ... | Duration of the experiment is of one year only. |
| —2 | | Do. ... | Do. ... | Do. ... | San hemp ploughed in .. | San hemp ploughed in. | San hemp ploughed in. | | |
| —3 | | Do. ... | Do. ... | Do. ... | San hemp ploughed in and rolled. | San hemp ploughed in and rolled. | San hemp ploughed in and rolled. | | |
| —4 | | Do. ... | Do. ... | Do. ... | San hemp ploughed in ... | San hemp ploughed in. | San hemp ploughed in. | | |
| | | | | **Experiments with Fodder.** | | | | | |
| 35—1 | To compare the yield of fodder. | Juar ... | Juar ... | Juar ... | *Nil.* ... | *Nil.* ... | *Nil.* ... | ... | Duration of the experiment is of one year only. |
| —2 | | Sorghum ... | Sorghum ... | Sorghum ... | Do. ... | Do. ... | Do. | | |